H. E. Dulsard

ANX
34

Convair TRAVELER

JANUARY 1954
VOLUME V
NUMBER 9

Convair TRAVELER

JANUARY 1954
VOLUME V
NUMBER 9

FOREWORD

It requires thousands of engineering hours to "build" an airplane on paper before it is ready to be built in the shop; thus, it is conceivable that it may take but one minute to fabricate a part that took 100 hours to design.

Information on how to produce these parts and how to assemble and install them can be found on the blueprint—the engineer's "picture language." This language, which tells in detail the story of complex systems, of fabrication, assembly, and installation, is understood by aircraft personnel who adapt the story to their particular needs.

The key to the Convair-Liner 340 story lies in this issue. In it you will find major drawing numbers of the wing, nacelle, fuselage, and empennage; an explanation of Convair's blueprint numbering system; and—as an extra dividend—loft lines of the wing, nacelle, and empennage.

Chief Engineer
F. W. Fink

Chief of Service
J. J. Alkazin

Editor
G. S. Hunter

ON THE COVER

The men on the cover are engaged in operations that can be accomplished successfully only through familiarity with and use of the blueprint. Appropriately, artist Harvey Adams features the blueprint, since it plays an important part in all phases of aircraft production and operation.

A digest of Convair-Liner operation and service published monthly by the Service Publications Section of Convair in the interest of Convair-Liner operators and for the promotion of sales and service. Communications should be addressed to Chief of Service Convair, San Diego 12, Calif

The information published in the Convair TRAVELER is to be considered accurate and authoritative as far as Convair approval is concerned. CAA approval, however, is not to be implied unless specifically noted. Airline personnel are therefore advised that use of this material may be restricted by their respective company policies or by CAA publications. Permission is hereby granted to republish any information here presented, but it is suggested that the material be verified with Convair to insure that it conforms with latest changes and developments.

Copyright 1954

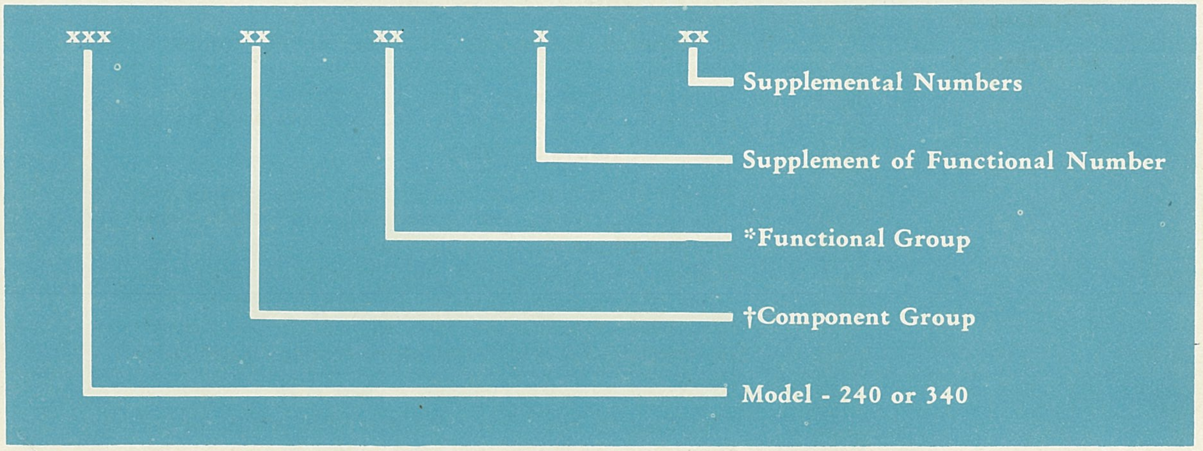
CONSOLIDATED VULTEE AIRCRAFT CORPORATION • SAN DIEGO, CALIFORNIA

Blueprint Numbering System

The blueprint is designed to furnish instructions for fabrication, installation, inspection, training, maintenance, and engineering. It is, in effect, an all-purpose aircraft manual.

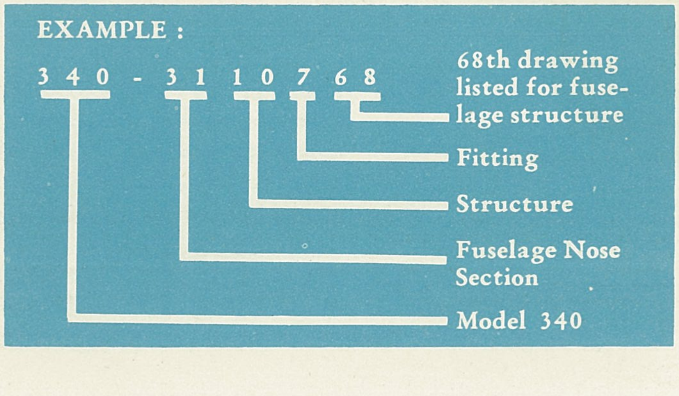
Anyone who is assigned to a job that necessitates working with prints knows the "picture language" of the engineer, his symbols and methods being standard, to a certain degree, throughout the industry. Drawing numbering systems, however, vary with different manufacturers. Convair's numbering system for Convair-Liners is an easily understood method that provides sufficient information for obtaining system, structure, and installation drawing numbers. These numbers may be obtained through a composition of figures, derived from the following drawing number breakdown.

Key drawing numbers for structural areas of the Convair-Liner 340 are found elsewhere in this issue. The numbers listed provide initial information for obtaining the desired drawings. They are, of course, subject to revision.

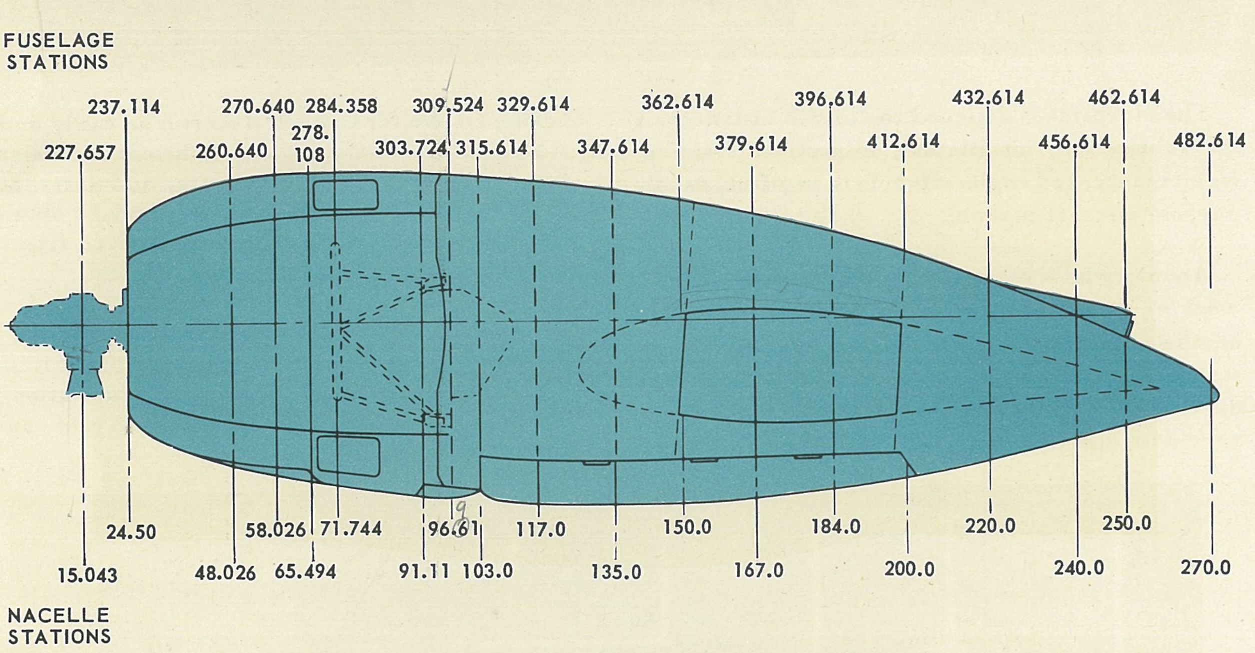


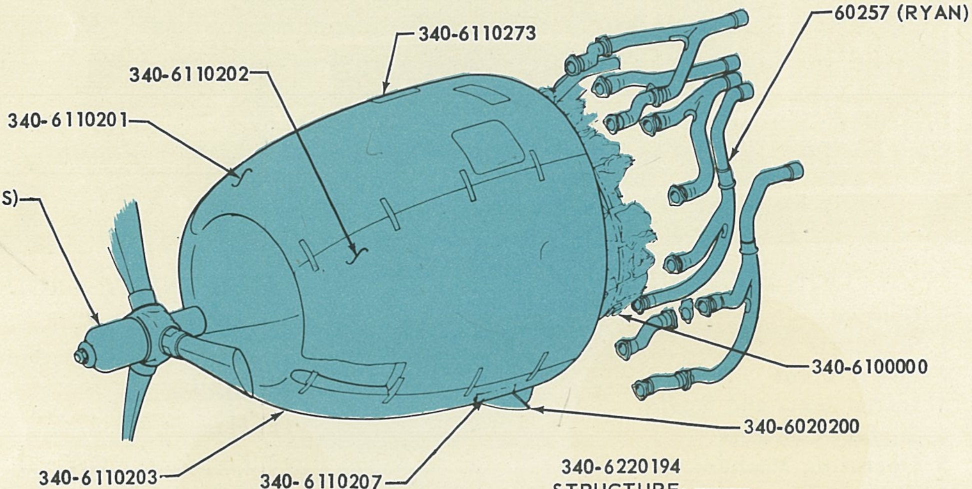
*FUNCTIONAL GROUP	
0	General
1	Structure
2	Power Plant
3	Instruments and Radio
4	Surface Controls
5	Operating Mechanisms
6	Electrical
8	Hydraulic
9	Furnishings

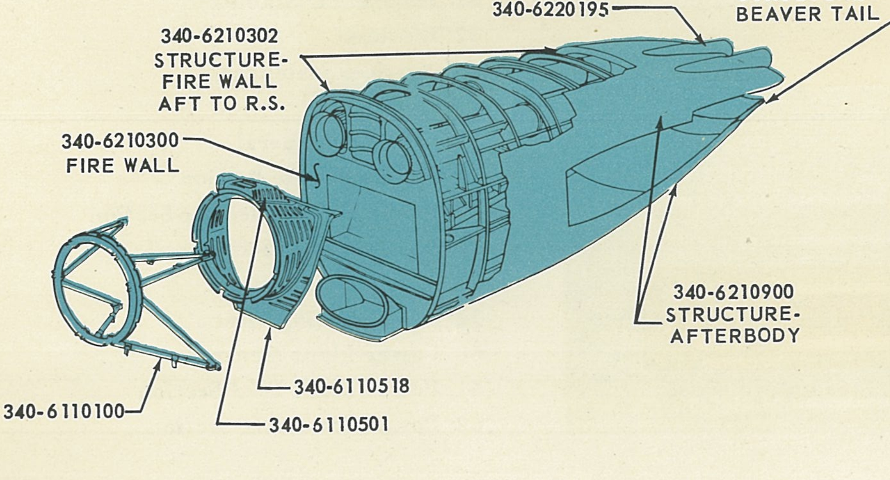
†COMPONENT GROUP	
00	General
16	Wing Center Section
17	Aileron
18	Flap
20	Empennage General
21	Horizontal Stabilizer
22	Elevator
23	Vertical Stabilizer
26	Rudder
30	Fuselage General
31	Fuselage Nose Section
33	Fuselage Intermediate Section
35	Fuselage Aft Section
51	Main Landing Gear
52	Nose Landing Gear
60	Power Plant General
61	Power Plant Fwd Section
62	Power Plant Aft Section



Nacelle Stations & Drawing Numbers

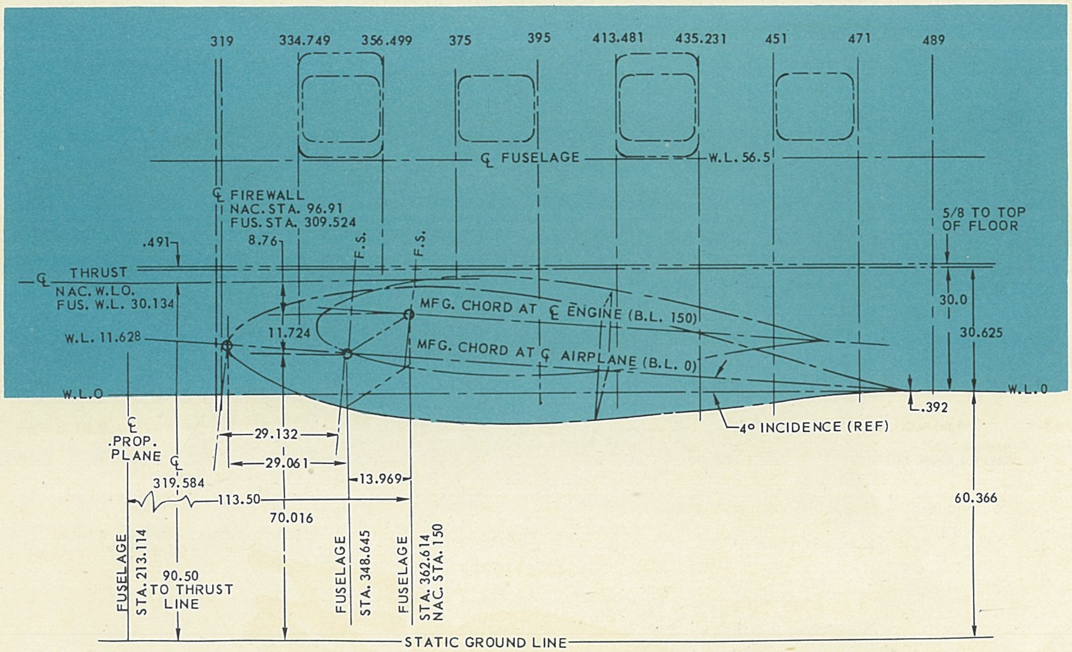






POWER PLANT ARRANGEMENT	340-6000000
COMPRESSOR INSTAL	340-6190500
FIRE DETECTOR	340-6160900
FUEL - ENGINE SEC	340-6120500
HYDRAULIC - ENGINE SECTION	340-6180000
MLG DOORS	340-6210401
OIL - ENGINE SECTION	340-6120600

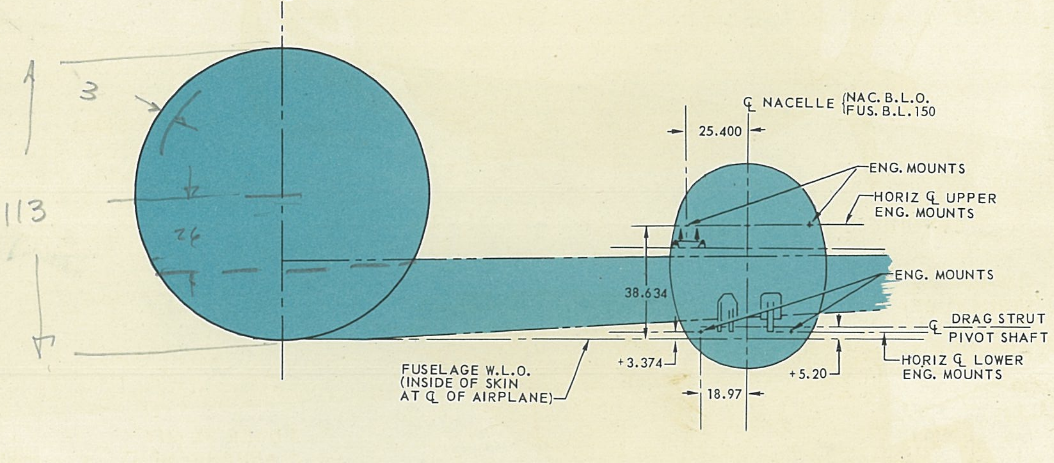
Nacelle Loft Lines

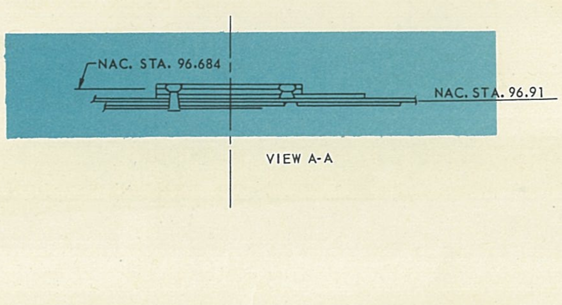


113

3

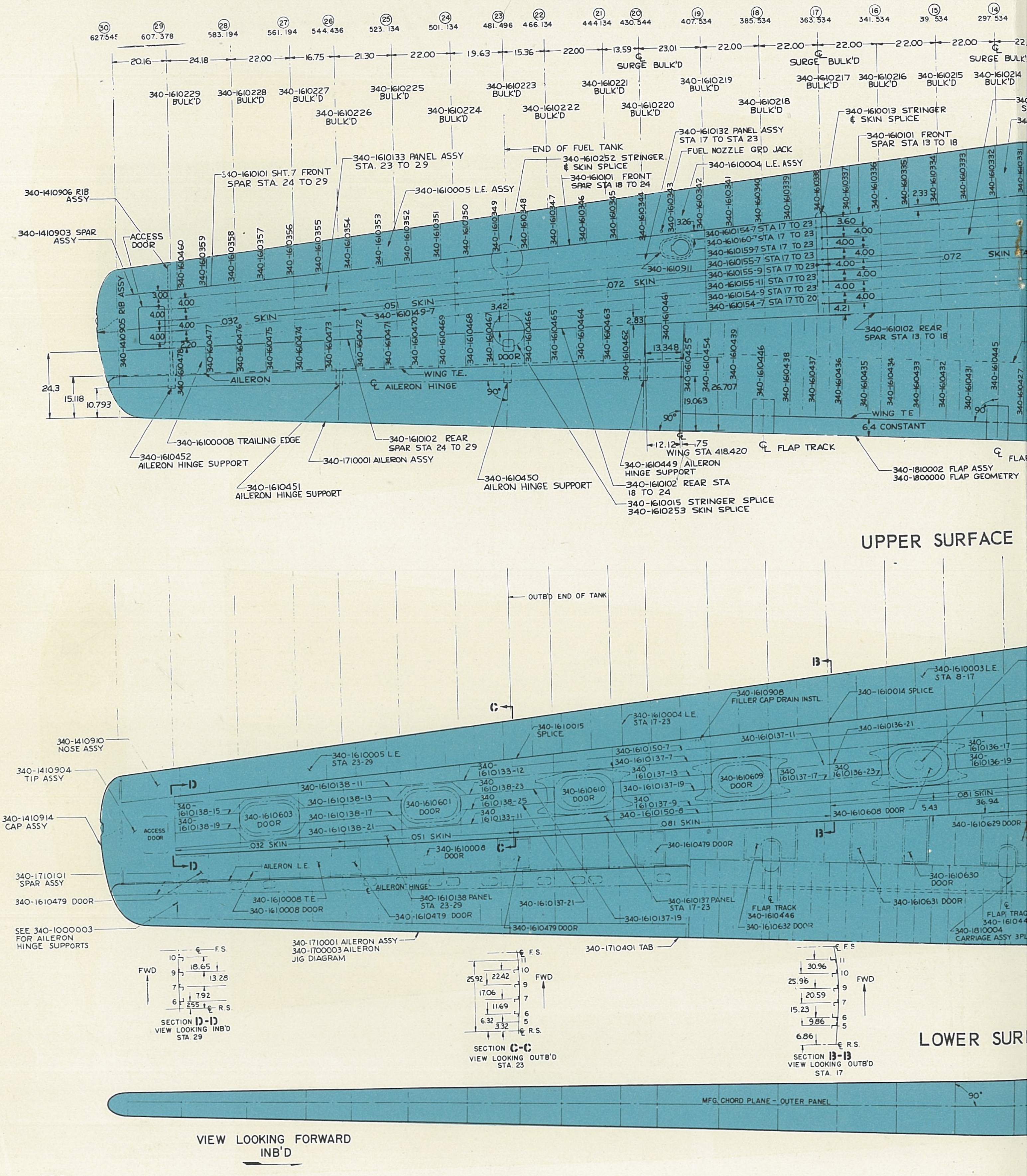
26


℄ FUSELAGE
3
113
26
℄ NACELLE {NAC. B.L.O. FUS. B.L. 150
25.400
ENG. MOUNTS
HORIZ ℄ UPPER ENG. MOUNTS
ENG. MOUNTS
38.634
℄ DRAG STRUT PIVOT SHAFT
HORIZ ℄ LOWER ENG. MOUNTS
FUSELAGE W.L.O. (INSIDE OF SKIN AT ℄ OF AIRPLANE)
+3.374
+5.20
18.97

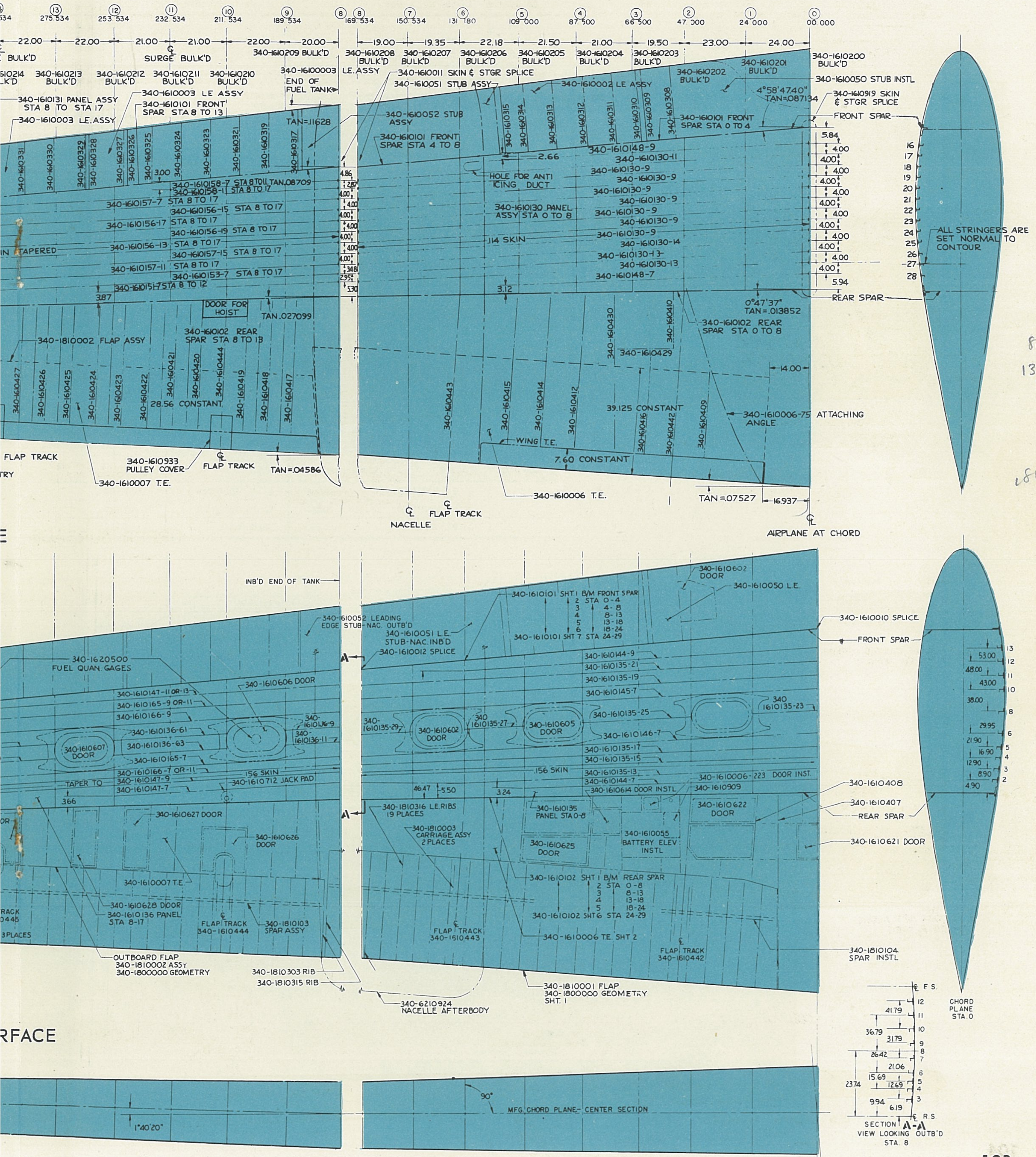


VIEW A-A

Wing Stations &



Drawing Numbers



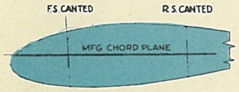
8.85

134

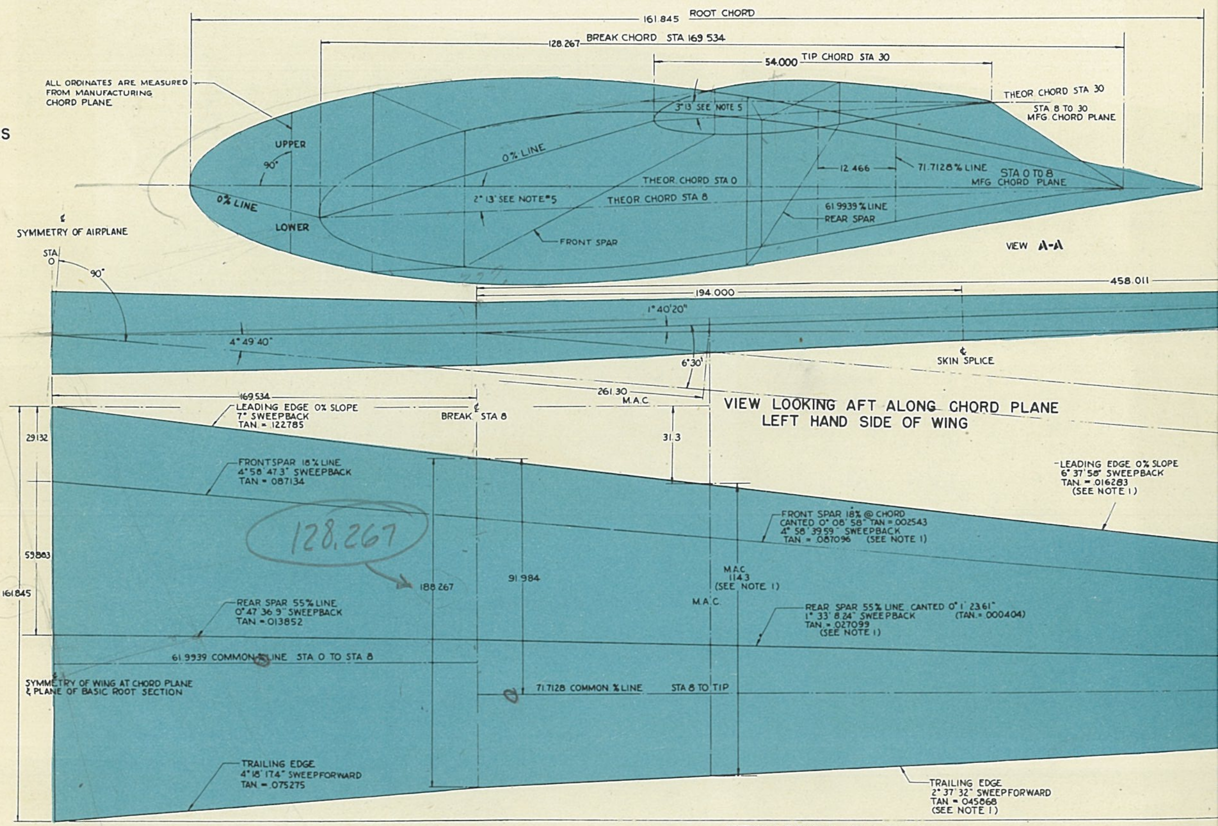
.85

Wing Loft Lines

% MFG CHORD	STATION 5			STATION 6		
	% in Inches	Upper Ord.	Lower Ord.	% in Inches	Upper Ord.	Lower Ord.
0.00	0	——	—3.174	0	——	—3.820
0.25	.351	—.798	—4.368	.340	—1.415	—4.891
0.50	.701	—.178	—4.986	.68	—.824	—5.478
0.75	1.052	+.318	—5.464	1.019	—.351	—5.932
1.25	1.753	1.097	—6.175	1.698	+.404	+6.608
2.50	3.506	2.537	—7.384	3.397	1.811	7.750
5.0	7.013	4.634	—8.930	6.793	3.876	9.187
7.5	10.519	6.269	—10.060	10.190	5.497	10.226
10.0	14.026	7.638	—10.963	13.586	6.856	11.052
15.0	21.038	9.802	—12.304	20.380	9.013	12.262
18.0 FS	25.246	10.813	—12.881	24.455	10.026	12.775
20.0	28.051	11.392	—13.196	27.173	10.608	13.051
25.0	35.064	12.548	—13.722	33.966	11.779	13.494
30.0	42.077	13.255	—13.891	40.750	12.513	13.600
35.0	49.090	13.527	—13.670	47.552	12.824	13.334
40.0	56.102	13.452	—13.153	54.345	12.799	12.788
45.0	63.115	13.106	—12.403	61.139	12.509	12.021
50.0	70.128	12.528	—11.477	37.932	11.992	11.090
55.0 RS	77.141	11.746	—10.409	74.725	11.274	10.038
60.0	84.154	10.789	—9.209	81.518	10.386	8.841
61.9939	86.950	——	——	81.227	——	——
65.0	91.166	9.668	—7.921	88.311	9.335	7.574
70.0	98.179	8.485	—6.621	95.104	8.220	6.302
71.7128						
75.0	105.192	7.257	—5.367	101.898	7.056	5.080
80.0	112.205	5.989	—4.160	108.691	5.846	3.911
85.0	119.218	4.676	—2.998	115.484	4.588	2.794
90.0	126.230	3.296	—1.897	122.277	3.253	1.744
95.0	133.243	1.826	—.894	129.070	1.820	.804
100.0 TE	140.256	(.125 Radius)		135.863	(.125 Radius)	
	L. E. RADIUS		3.964	L. E. RADIUS		3.780
	% In INCHES		3.900	% In INCHES		3.696
	ORDINATE		—2.570	ORDINATE		—3.142

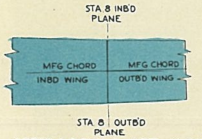


VIEW SHOWING CANTED SPARS IN OUTB'D WING


161.845 ROOT CHORD
128.267 BREAK CHORD STA 169 534
54.000 TIP CHORD STA 30
ALL ORDINATES ARE MEASURED FROM MANUFACTURING CHORD PLANE
THEOR CHORD STA 30
STA 8 TO 30 MFG CHORD PLANE
UPPER
90°
0% LINE
3° 13' SEE NOTE 5
0% LINE
2° 13' SEE NOTE 5
THEOR. CHORD STA 0
THEOR CHORD STA 8
12.466
71.7128 % LINE
STA 0 TO 8 MFG CHORD PLANE
61.9939 % LINE
REAR SPAR
LOWER
FRONT SPAR
VIEW A-A
℄ SYMMETRY OF AIRPLANE
STA 0
90°
458.011
194.000
1° 40' 20"
4° 49' 40"
6° 30'
℄ SKIN SPLICE
169.534
261.30 M.A.C.
LEADING EDGE 0% SLOPE 7° SWEEPBACK TAN = .122785
℄ BREAK STA 8
31.3
29.132
FRONTSPAR 18% LINE 4° 58' 47.3" SWEEPBACK TAN = .087134
LEADING EDGE 0% SLOPE 6° 37' 58" SWEEPBACK TAN = .016283 (SEE NOTE 1)
FRONT SPAR 18% @ CHORD CANTED 0° 08' 58" TAN = .002543 4° 58' 39.59" SWEEPBACK TAN = .087096 (SEE NOTE 1)
128.267
59.883
188.267
91.984
M.A.C. 114.3 (SEE NOTE 1)
M.A.C.
161.845
REAR SPAR 55% LINE 0° 47' 36.9" SWEEPBACK TAN = .013852
REAR SPAR 55% LINE CANTED 0° 1' 23.61" (TAN = .000404) 1° 33' 8.24" SWEEPBACK TAN = .027099 (SEE NOTE 1)
61.9939 COMMON % LINE STA 0 TO STA 8
℄ SYMMETRY OF WING AT CHORD PLANE & PLANE OF BASIC ROOT SECTION
71.7128 COMMON % LINE STA 8 TO TIP
TRAILING EDGE 4° 18' 17.4" SWEEPFORWARD TAN = .075275
TRAILING EDGE 2° 37' 32" SWEEPFORWARD TAN = .045868 (SEE NOTE 1)

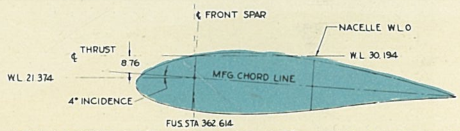
VIEW LOOKING AFT ALONG CHORD PLANE LEFT HAND SIDE OF WING

VIEW LOOKING UP AT LOWER SURFACE NORMAL TO INB'D WING CHORD PLANE



VIEW LOOKING AFT ALONG CHORD PLANES

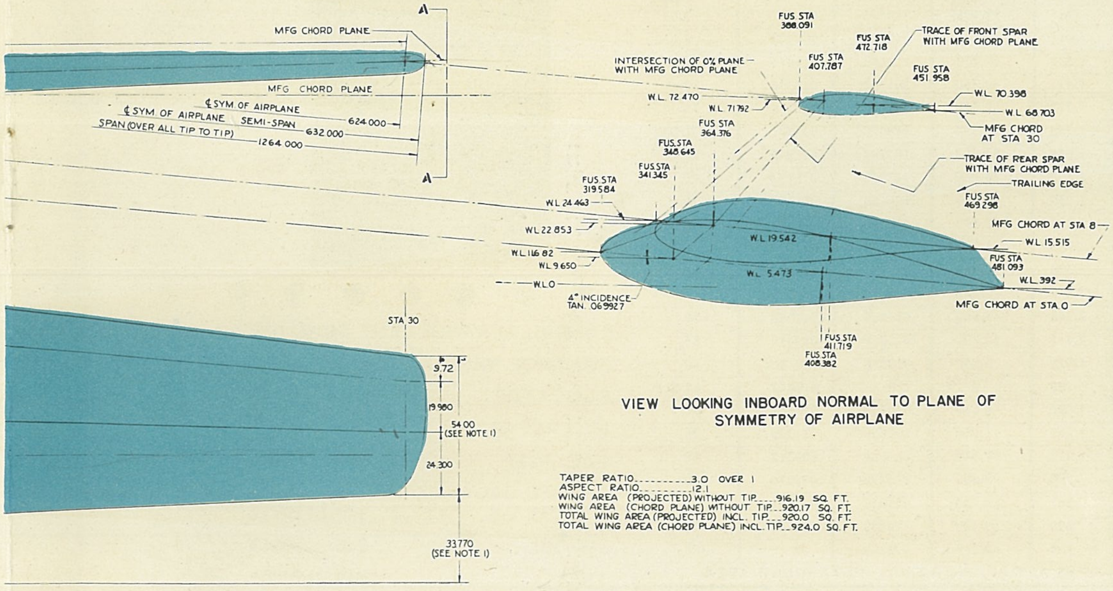
STATION 7			STATION 8			% MFG CHORD	STATION 9			STATION 10		
% in Inches	Upper Ord.	Lower Ord.	% in Inches	Upper Ord.	Lower Ord.		% in Inches	Upper Ord.	Lower Ord.	% in Inches	Upper Ord.	Lower Ord.
0	——	—4.384	0	——	—4.937	0	0	——	—4.772	0	——	—4.684
.330	—1.953	—5.348	.321	—2.481	—5.796	.25	.312	—2.489	—5.655	.304	—2.481	—5.538
.660	—1.388	—5.907	.641	—1.941	—6.330	.50	.625	—1.963	—6.178	.607	—1.972	—6.043
.990	—.933	—6.340	.962	—1.506	—6.741	.75	.938	—1.535	—6.584	.911	—1.558	—6.434
1.650	—.200	—6.985	1.603	—.793	—7.356	1.25	1.563	—.839	—7.181	1.518	—.883	—7.010
3.301	+1.178	—8.069	3.207	+.558	—8.382	2.5	3.126	.482	—8.179	3.036	.398	—7.973
6.602	3.215	—9.410	6.413	2.566	—9.630	5	6.251	2.437	—9.389	6.073	2.293	—9.141
9.902	4.823	—10.371	9.620	4.161	—10.513	7.5	9.377	3.993	—10.241	9.109	3.801	—9.962
13.203	6.173	—11.129	12.827	5.502	—11.205	10	12.502	5.295	—10.909	12.146	5.063	—10.605
19.805	8.324	—12.225	19.240	7.648	—12.189	15	18.754	7.376	—11.854	18.218	7.080	—11.514
23.765	9.339	—12.683	23.088	8.665	—12.592	18	22.504	8.370	—12.259	21.862	8.044	—11.902
26.406	9.924	—12.925	25.653	9.253	—12.801	20	25.005	8.937	—12.462	24.291	8.595	—12.096
33.008	11.109	—13.295	32.067	10.451	—13.099	25	31.256	10.104	—12.747	30.364	9.727	—12.367
39.609	11.866	—13.346	38.480	11.231	—13.097	30	37.507	10.865	—12.742	36.437	10.469	—12.358
46.211	12.210	—13.041	44.893	11.608	—12.753	35	43.758	11.241	—12.405	42.510	10.837	—12.030
52.812	12.229	—12.470	51.307	11.671	—12.157	40	50.010	11.301	—11.824	48.583	10.901	—11.465
59.414	11.988	—11.688	57.720	11.477	—11.361	45	56.261	11.117	—11.050	54.656	10.726	—10.713
66.015	11.524	—10.752	64.134	11.064	—10.420	50	62.512	10.718	—10.133	60.729	10.344	—9.822
72.617	10.862	—9.693	70.547	10.459	—9.365	55	68.763	10.132	—9.105	66.801	9.779	—8.823
79.218	10.035	—8.520	76.960	9.690	—8.206	60	75.014	9.388	—7.975	72.874	9.060	—7.726
81.851	——	——	79.518	——	——		——	——	——	——	——	——
85.820	9.044	—7.271	83.374	8.758	—6.974	65	81.266	8.487	—6.778	78.947	8.193	—6.566
92.421	7.989	—6.024	89.787	7.762	—5.751	70	87.517	7.523	—5.589	85.020	7.264	—5.413
						71.7128	89.658	7.181	—5.192	87.100	6.935	—5.030
99.023	6.881	—4.830	96.200	6.709	—4.585	75	93.768	6.504	—4.456	91.093	6.282	—4.317
105.624	5.772	—3.694	102.614	5.600	—3.481	80	100.019	5.430	—3.383	97.116	5.247	—3.277
112.226	4.510	—2.616	109.027	4.435	—2.442	85	106.270	4.301	—2.372	103.238	4.158	—2.298
118.827	3.216	—1.611	115.440	3.179	—1.480	90	112.522	3.085	—1.439	109.311	2.984	—1.395
125.429	1.814	—.725	121.854	1.809	—.648	95	118.773	1.758	—.630	115.384	1.703	—.612
132.030	(.125 Radius)		128.267	(.125 Radius)		100	125.024	T.E.R.	.125	121.457	T.E.R.	.125
L. E. RADIUS		3.603	L. E. RADIUS		3.438		CENTER OF L. E. RADIUS			CENTER OF L. E. RADIUS		
% In INCHES		3.517	% In INCHES		3.342		% In INCHES		3.231	% In INCHES		3.109
ORDINATE		—3.642	ORDINATE		—4.132		ORDINATE		4.074	ORDINATE		4.013



VIEW LOOKING INB'D NORMAL TO INB'D WING CHORD PLANE
℄ OF NACELLE, WING STA. 150.534

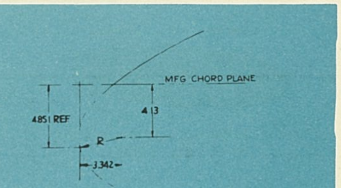
5) DIMENSIONS SHOW THE MANNER IN WHICH THE DEGREE OF WASHOUT IN WING IS MEASURED
4.) ALL ORDINATES ARE TAKEN TO INSIDE OF SKIN & ARE GIVEN FROM MANUFACTURING CHORD PLANE.
3) VIEW A-A IS IN MANUFACTURING CHORD PLANE & SHOWS RELATION BETWEEN ROOT, BREAK & TIP SECTION, ALSO, METHOD OF MEASURING ORDINATES. ENVELOPE OF WING IS DEFINED BY CONNECTING CORRESPONDING PERCENT POINTS AT ROOT, BREAK & TIP.
2.) OUTBOARD OF STA 8, THE FRONT SPAR IS CANTED 0°8'44.1" (TAN.=.002543) & THE REAR SPAR IS CANTED 0°1'23.61" (TAN. =.000404).
1.) IN PLAN VIEW, NOTED CALL-OUTS, OUTB'D OF STA. 8 ARE TRUE ONLY IN CHORD PLANE. (VIEW SHOWN IS PROJECTED).

NOTES:

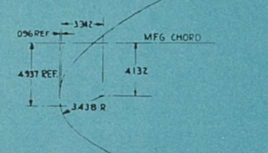


VIEW LOOKING INBOARD NORMAL TO PLANE OF SYMMETRY OF AIRPLANE

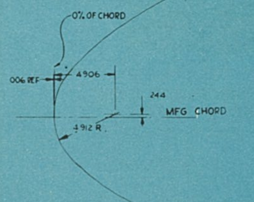
TAPER RATIO..........3.0 OVER 1
ASPECT RATIO..........12.1
WING AREA (PROJECTED) WITHOUT TIP.....916.19 SQ. FT.
WING AREA (CHORD PLANE) WITHOUT TIP...920.17 SQ. FT.
TOTAL WING AREA (PROJECTED) INCL. TIP...920.0 SQ. FT.
TOTAL WING AREA (CHORD PLANE) INCL. TIP...924.0 SQ. FT.



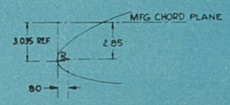
LEADING EDGE STA. 8 OUTER PANEL



LEADING EDGE STA. 8 INB'D PANEL

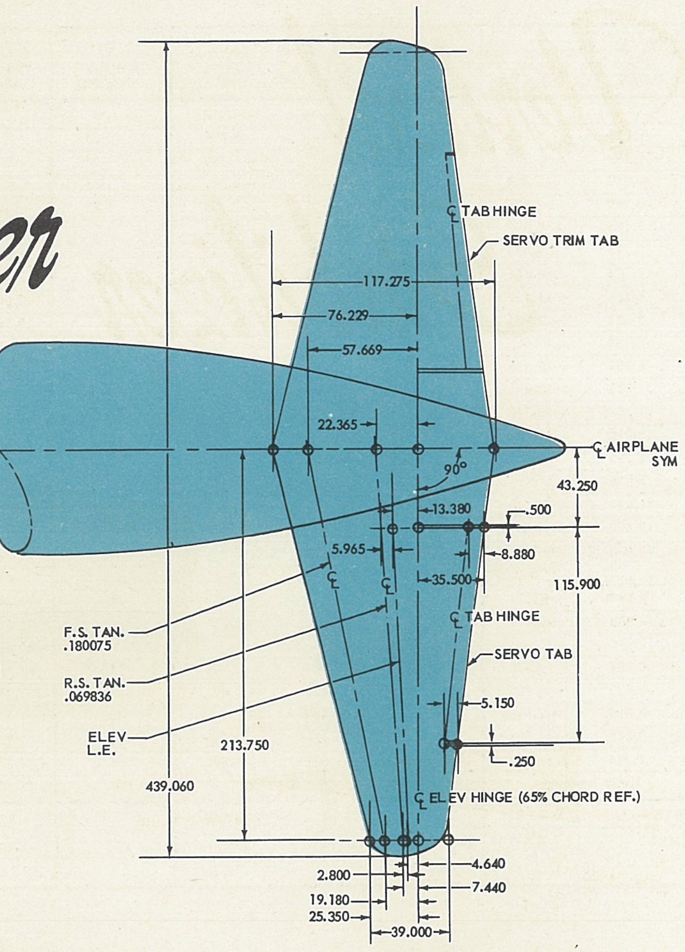


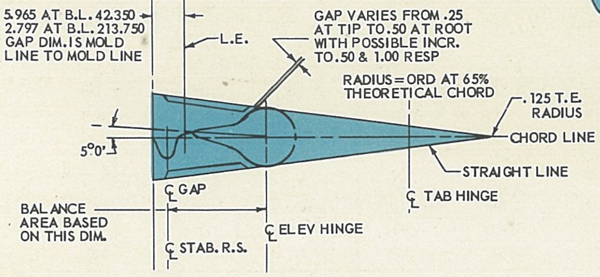
LEADING EDGE STA. 0 (ROOT)



LEADING EDGE STA. 30 (627.545)

Horizontal Stabilizer

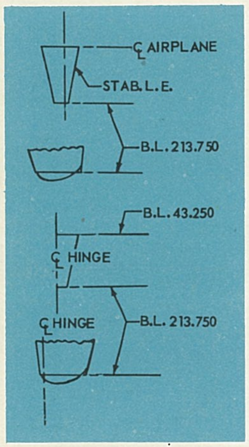




5.965 AT B.L. 42.350
2.797 AT B.L. 213.750
GAP DIM. IS MOLD LINE TO MOLD LINE
L.E.
GAP VARIES FROM .25 AT TIP TO .50 AT ROOT WITH POSSIBLE INCR. TO .50 & 1.00 RESP
RADIUS = ORD AT 65% THEORETICAL CHORD
.125 T.E. RADIUS
CHORD LINE
5°0'
STRAIGHT LINE
℄ GAP
℄ TAB HINGE
BALANCE AREA BASED ON THIS DIM.
℄ ELEV HINGE
℄ STAB. R.S.

MODEL 340 HORIZONTAL STABILIZER APEX 319.500

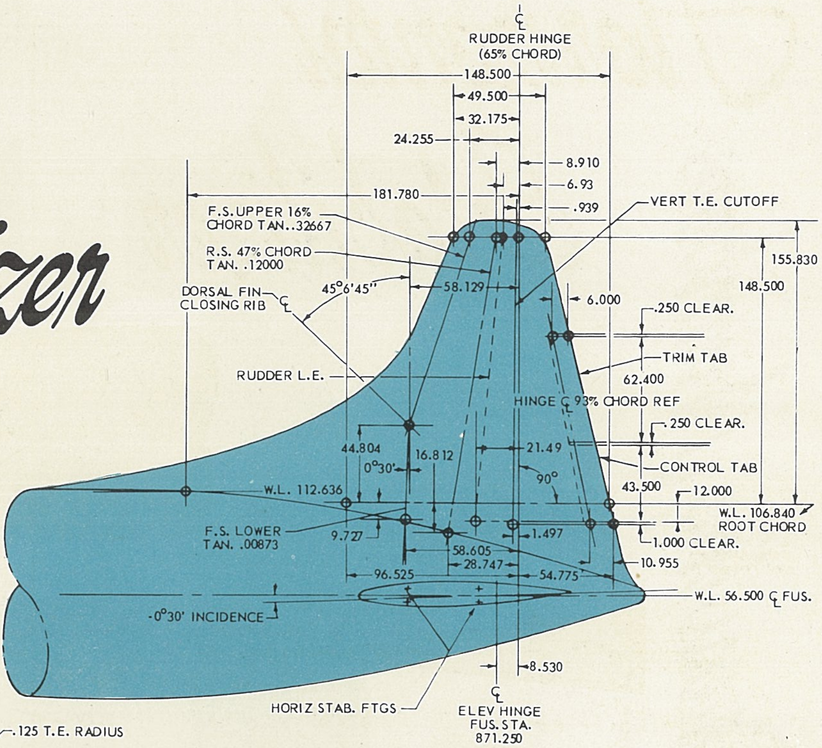
%	ROOT (B.L. 0) % in Inches	ROOT (B.L. 0) ORD.	TIP (B.L. 213.0) % in Inches	TIP (B.L. 213.0) ORD.	DISTANCE FROM C.P. ROOT	SLOPE IN CHORD PLANE	ORD. SLOPE L.E.R.	%
0	0	R 1.250	0	R .417	76.050	.238028	.00391236	0
.50	.585	1.080	.195	.360	75.465	.236197	.003380	.50
.75	.878	1.298	.293	.433	75.172	.235280	.004063	.75
1.25	1.463	1.623	.488	.541	74.587	.233449	.005080	1.25
2.50	2.925	2.194	.975	.731	73.125	.228873	.006867	2.50
5.00	5.850	3.049	1.950	1.016	70.200	.219718	.009543	5.00
7.50	8.775	3.711	2.925	1.237	67.275	.210563	.011615	7.50
10	11.700	4.267	3.900	1.422	64.350	.201408	.013355	10
15	17.550	5.150	5.850	1.717	58.500	.183099	.016119	15
15.82532 F.S.	18.516	5.273	6.172	1.755	57.534	.180076	.016501	15.82532
20	23.400	5.821	7.800	1.940	52.650	.164789	.018219	20
25	29.250	6.325	9.750	2.108	46.800	.146479	.019797	25
30	35.100	6.688	11.700	2.229	40.450	.128169	.020933	30
35	40.950	6.917	13.650	2.306	35.100	.109859	.021649	35
40	46.800	7.016	15.600	2.339	29.250	.091549	.021959	40
45	52.650	6.960	17.550	2.320	23.400	.073239	.021784	45
45.92959 R.S.	53.738	6.937	17.912	2.312	22.312	.069834	.021714	45.92959
50	58.500	6.736	19.500	2.245	17.550	.054930	.021083	50
55	64.350	6.332	21.450	2.111	11.700	.036620	.019818	55
60	70.200	5.783	23.400	1.928	5.850	.018310	.018100	60
65 C.P.	76.050	5.126	25.350	1.709	0	0	.016044	65 C.P.
70	81.900	4.410	27.300	1.480	5.850	.018310	.013802	70
75	87.750	3.693	29.250	1.252	11.700	.036620	.011559	75
80	93.600	2.977	31.200	1.024	17.550	.054930	.009317	80
85	99.450	2.260	33.150	.796	23.400	.073239	.007074	85
90	105.300	1.544	35.100	.567	29.250	.091549	.004831	90
95	111.150	.827	37.050	.339	35.100	.109859	.002589	95
100	117.000	R .125	39.000	R .125	40.950	.128169	0	100
			ORD. SLOPES AFT OF 65% DO NOT GO THROUGH APEX					

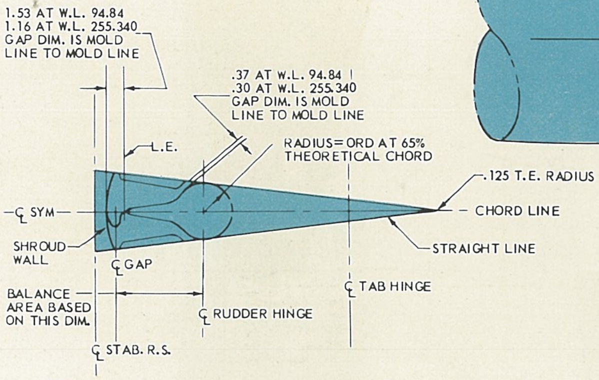


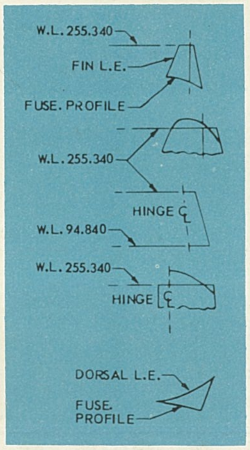
• • • • • • •

GENERAL ARRANGEMENT	340-2110007
BALANCE WEIGHT	240-2610005
ELEVATOR	340-2200001
INTERSPAR	340-2110001
L. E. ASSY	240-2110002
SEALED BALANCE CURTAIN	340-2210912
SHROUD	340-2110613
TIP	240-2110901

Vertical Stabilizer







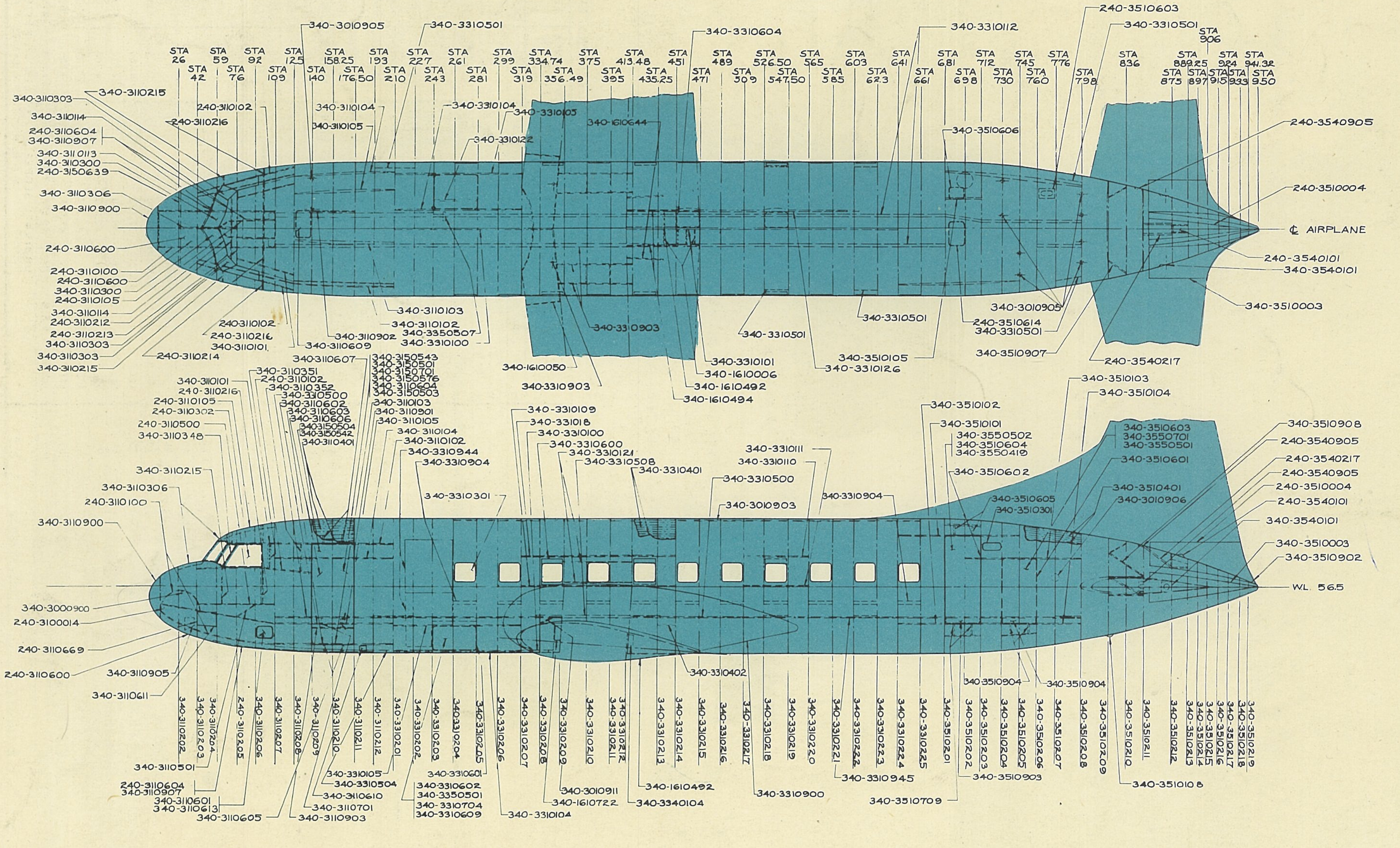
GENERAL ARRANGEMENT	340-2300000
DORSAL	240-2510001
GAP FAIRING	240-2510901
INTERSPAR	340-2310001
L. E. ASSY	240-2310002
RUDDER	240-2600000
TIP	240-2310901
T. E. ASSY	240-2310004

MODEL 340 VERTICAL STABILIZER APEX W.L. 329.59

%	ROOT		TIP		DISTANCE FROM C% ROOT	SLOPE (In Chord Plane)	ORD. SLOPE	%
	W.L. 106.84 STA.	ORD.	W.L. 255.34 STA.	ORD.				
0	0	L.E.R. 1.125	0	L.E.R. .375	96.525	.433333	0	0
.5	.742	1.371	.247	.457	95.783	.430000	.006154	.5
.75	1.114	1.647	.372	.549	95.411	.428331	.007394	.75
1.25	1.857	2.060	.619	.687	94.668	.424997	.009248	1.25
2.5	3.713	2.785	1.238	.928	92.813	.416666	.012501	2.5
5	7.425	3.870	2.475	1.290	89.100	.400000	.017374	5
7.5	11.138	4.711	3.713	1.571	85.383	.383313	.021147	7.5
10	14.850	5.416	4.950	1.805	81.675	.366667	.024315	10
15	22.275	6.537	7.425	2.179	74.250	.333333	.029345	15
16 F.S.	23.760	6.720	7.920	2.240	72.765	.326667	.030168	16
20	29.700	7.388	9.900	2.462	66.825	.300000	.033168	20
25	37.125	8.028	12.375	2.676	59.400	.266667	.036040	25
30	44.550	8.488	14.850	2.830	51.975	.233333	.038105	30
35	51.975	8.780	17.325	2.927	44.550	.200000	.039414	35
40	59.400	8.905	19.800	2.968	37.125	.166667	.039980	40
45	66.825	8.834	22.275	2.945	29.700	.133333	.039661	45
47 R.S.	69.795	8.755	23.265	2.920	26.730	.120000	.039293	47
50	74.250	8.549	24.750	2.849	22.275	.100000	.038380	50
55	81.675	8.037	27.225	2.679	14.850	.066667	.036081	55
60	89.100	7.340	29.700	2.447	7.425	.033333	.032954	60
65	96.525	6.506	32.175	2.169	0	0	.029208	65
70	103.950	5.590	34.650	1.877	7.425	.033333	.025091	70
75	111.375	4.675	37.125	1.575	14.850	.066667	.020970	75
80	118.800	3.759	39.600	1.277	22.275	.100000	.016889	80
85	126.225	2.844	42.075	.986	29.700	.133333	.012768	85
90	133.650	1.929	44.550	.689	37.125	.166667	.008646	90
95	141.075	1.013	47.025	.396	44.550	.200000	.004525	95
100	148.500	T.E.R. .125	49.500	T.E.R. .125	51.975	.233333	0	100
	ORDINATE SLOPES AFT OF 65% DO NOT GO THROUGH APEX L.E.R. RATE-OF-CHANGE .0050505							

Fuselage Stations & Drawing Numbers

(SEE DECEMBER 1, 1951 TRAVELER FOR LOFT LINES)



return to Gino

ANX 34

Convair TRAVELER

FEBRUARY 1954
VOLUME V
NUMBER 10

Convair TRAVELER

FEBRUARY 1954
VOLUME V
NUMBER 10

FOREWORD

The boarding and deplaning of passengers, and the simultaneous loading and unloading of cargo are a result of the functional efficiency built into the Convair-Liner. Pertinent data regarding cargo areas, load limitations, door sizes and clearances, along with package loading sheets for both the Convair-Liners 240 and 340 are contained in this issue. The package loading sheets are intended to provide the maximum size package that can be loaded into each cargo area. They should be of value to fleet service personnel.

Chief Engineer
F. W. Fink

Chief of Service
J. J. Alkazin

Editor
G. S. Hunter

ON THE COVER

How would you illustrate the Convair-Liner's time-saving operations at the airport? Artist Harvey Adams used the stylized pattern on our cover to give his impressions of these simultaneous operations.

A digest of Convair-Liner operation and service published monthly by the Service Publications Section of Convair in the interest of Convair-Liner operators and for the promotion of sales and service. Communications should be addressed to Chief of Service, Convair, San Diego 12, Calif.

The information published in the Convair TRAVELER is to be considered accurate and authoritative as far as Convair approval is concerned. CAA approval, however, is not to be implied unless specifically noted. Airline personnel are therefore advised that use of this material may be restricted by their respective company policies or by CAA publications. Permission is hereby granted to republish any information here presented, but it is suggested that the material be verified with Convair to insure that it conforms with latest changes and developments.

Copyright 1954

CONSOLIDATED VULTEE AIRCRAFT CORPORATION • SAN DIEGO, CALIFORNIA

CARGO LOADING

The locations of Convair-Liner cargo areas permit simultaneous passenger, baggage, and cargo loading and unloading, thereby reducing to a minimum the time lost at airport stops.

"Carry on" luggage racks are located in the passenger entrance compartment of all Convair-Liners. The luggage racks, accessible during flight, are conveniently placed so that passengers may stow their own luggage as they pass through the entrance compartment.

A rear service door, located between stations 681 and 712 (628 and 658 on the 240) on the left-hand side of the fuselage, permits lavatory and buffet servicing to save time and confusion at the airport. This door on the Convair 340 operates on a parallelogram hinge and, in the open position, remains approximately parallel with the fuselage. The minimum clearance from the door edge to the door jam—fore and aft—is approximately five inches; thus, loading ramps and stairways can be moved close to the doorway without danger of damage to the door.

There are three cargo areas in the Convair-Liner 340; a forward, rear, and lower compartment.

The forward cargo compartment is located on the right-hand side of the fuselage between stations 140 and 243. The loading door is located between stations 140 and 176.50. The area may be entered through a door in the passenger entrance compartment. The door is hidden from view by a movable curtain which covers the passengers' coats. The exterior door, 36½ inches wide by 48 inches high, is hinged at the top and provided with a self-energizing seal.

Eight flush-type tie-down fittings are installed in the floor, with three ring-type tie-down fittings installed on the outboard wall. The flooring is designed for an average static load of 150 pounds per square foot to allow for a cargo density of 25 pounds per cubic foot, loaded to a height of six feet.

The aft cargo compartment is located in the aft part of the fuselage from station 730 to station 798 on the right-hand side, and from stations 745 to 798 on the left-hand side. Access to the compartment is through a door on the right-hand side of the airplane. The door is hinged at the top with a piano hinge, and is provided with a self-energizing seal. The compartment has 12 flush-type tie-down rings installed in the floor, with five ring-type tie-downs installed in the wall. A rotatable full-height, web-type gate is provided for the separation and retention of cargo. The flooring is designed for a maximum static loading of 150 pounds per square foot.

A hinged panel in the aft wall of the lavatory, locked with a key, provides emergency access to the aft cargo compartment.

The lower cargo compartment is located under the floor from station 193 to station 319. The door is located between stations 243 and 281 on the right-hand side. The piano hinge is located on the lower edge, permitting the door to open downward, which provides easy access to the cargo area. Latches hold the door in the open position.

The flooring and structure are designed to support a maximum static weight load of 65 pounds per square foot. A full-height web-type gate is provided for separating and retaining baggage in this compartment.

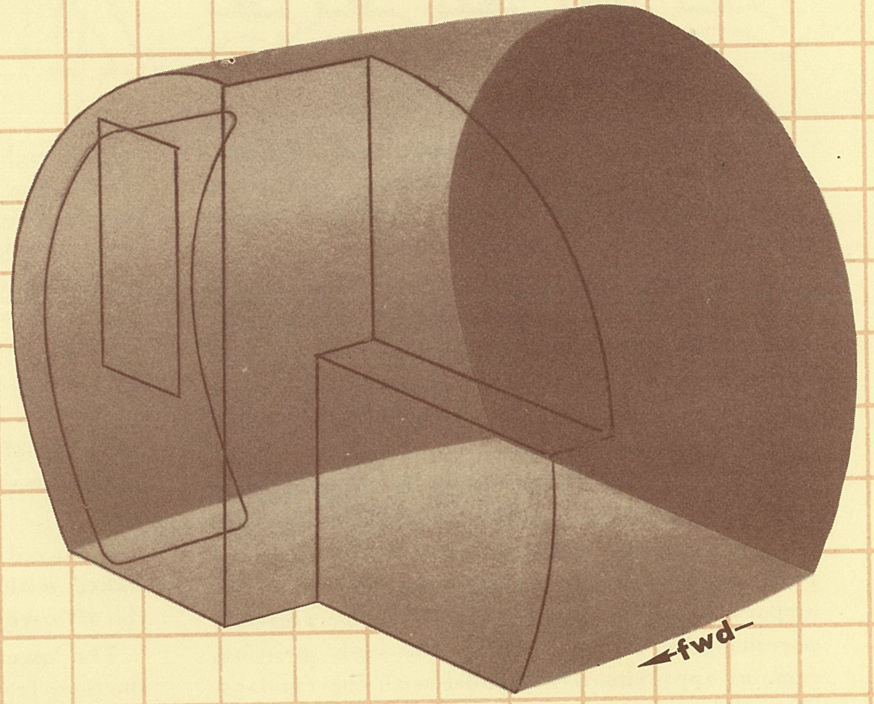
Removable panels in the compartment permit easy inspection and maintenance of certain electrical equipment, and of control cables.

Three configurations of the Convair-Liner 240 were originally delivered and several operators have revised the interior configuration. Because of these revisions, plus the differences in locations of doors, and of buffet, baggage, and cargo compartments, only area, volume, floor loading, and package loading charts for the basic version (with forward RH loading ramp) are given.

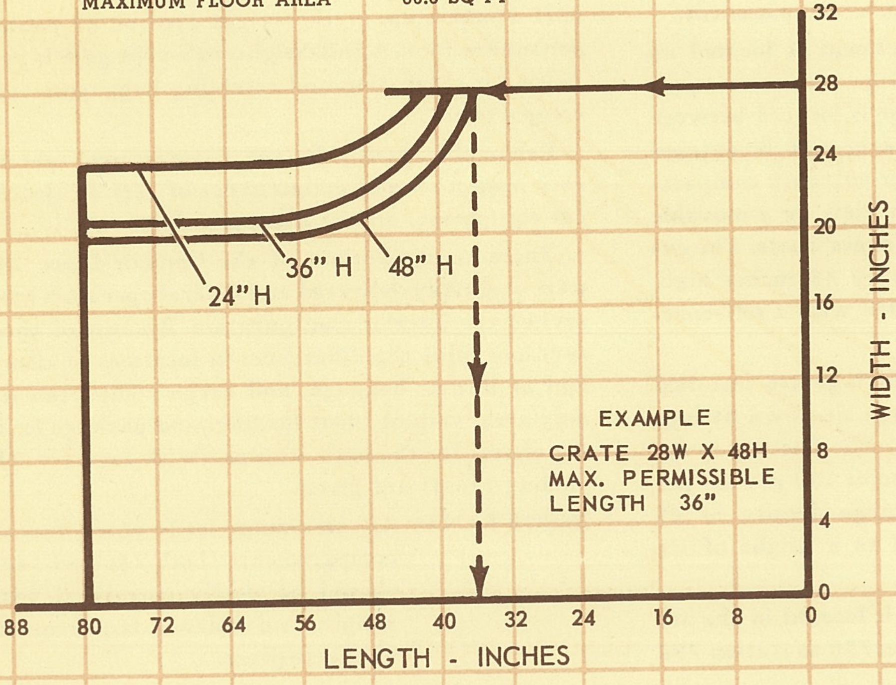
IMPORTANT: All maximum loads noted for all compartments (both 240 and 340) should be closely correlated with weight and balance requirements of the airplane.

Aft Cargo Compartment

CONVAIR-LINER
340



LOADING DOOR	30" WIDE x 48" HIGH
MAXIMUM FLOOR LOADING	150 LB/SQ FT
MAXIMUM FLOOR LOAD	1800 LB
MAXIMUM VOLUME	199.2 CU FT
MAXIMUM FLOOR AREA	33.5 SQ FT

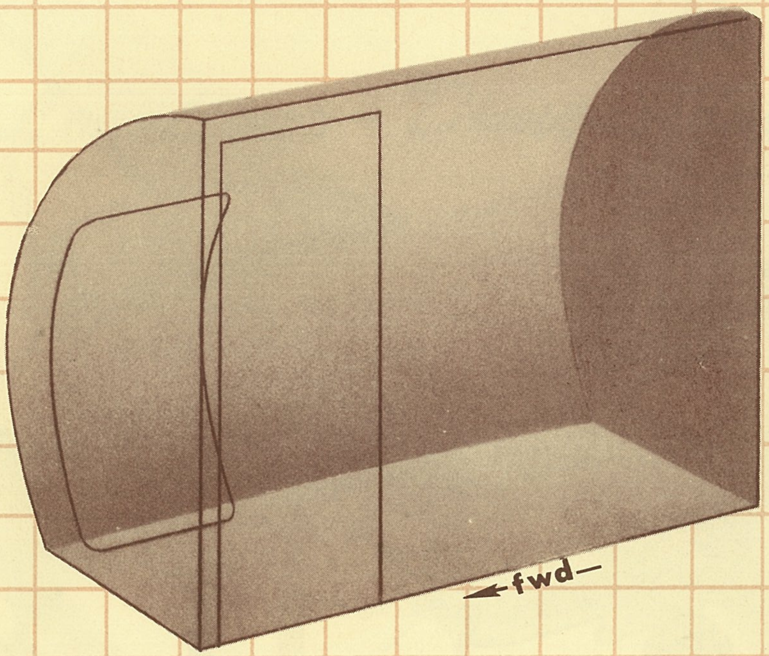


EXAMPLE
CRATE 28W X 48H
MAX. PERMISSIBLE
LENGTH 36"

PACKAGE SIZE VARIATIONS

48" HIGH	W	28	24	21	18
	L	36	40	47	80
36" HIGH	W	28	24	21	18
	L	39	44	74	80
24" HIGH	W	28	24		
	L	42	80		

Forward Cargo Compartment

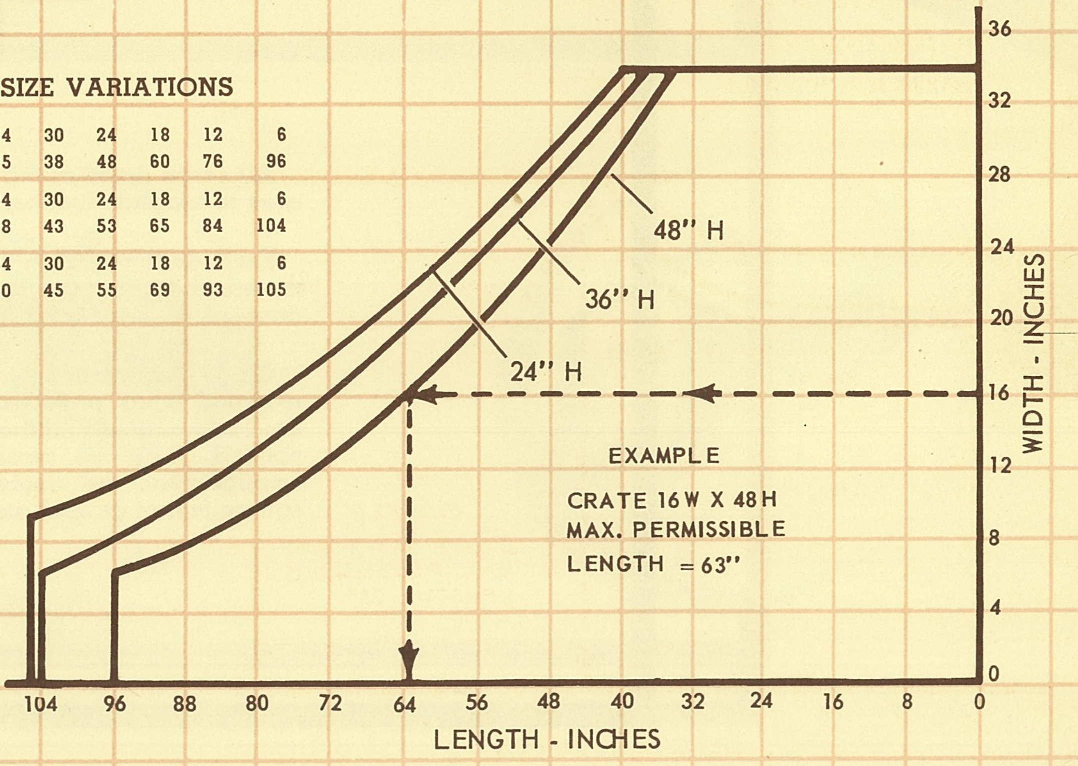


CONVAIR-LINER
340

LOADING DOOR	36" WIDE x 48" HIGH
MAXIMUM FLOOR LOADING	150 LB/SQ FT
MAXIMUM FLOOR LOAD	1800 LB
MAXIMUM VOLUME	152.7 CU FT
MAXIMUM FLOOR AREA	26.5 SQ FT

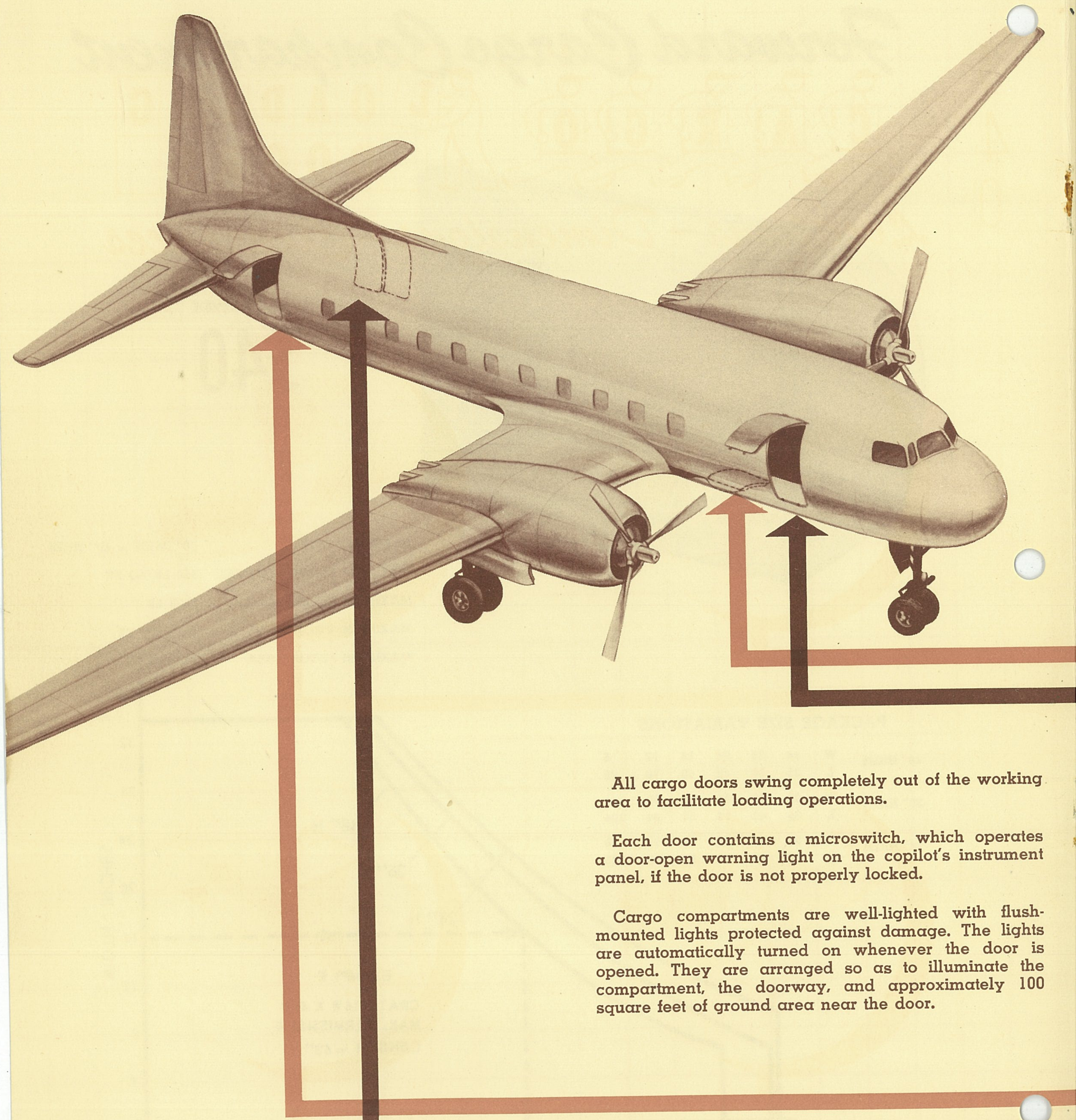
PACKAGE SIZE VARIATIONS

48" HIGH	W	34	30	24	18	12	6
	L	35	38	48	60	76	96
36" HIGH	W	34	30	24	18	12	6
	L	38	43	53	65	84	104
24" HIGH	W	34	30	24	18	12	6
	L	40	45	55	69	93	105



EXAMPLE

CRATE 16W X 48H
MAX. PERMISSIBLE
LENGTH = 63"



All cargo doors swing completely out of the working area to facilitate loading operations.

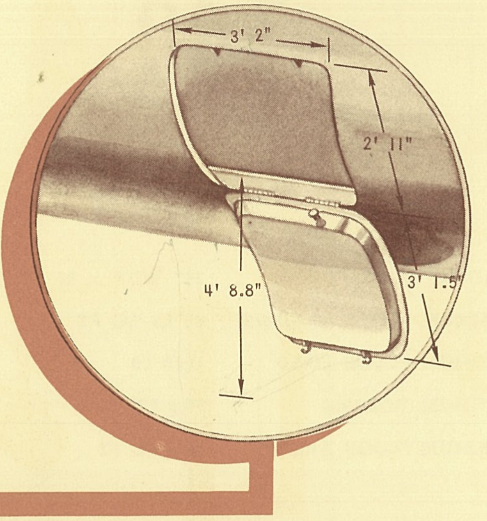
Each door contains a microswitch, which operates a door-open warning light on the copilot's instrument panel, if the door is not properly locked.

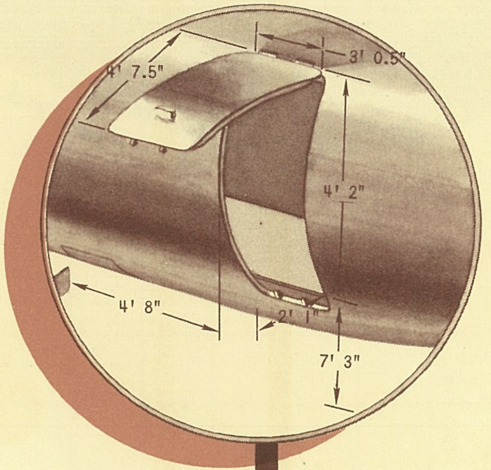
Cargo compartments are well-lighted with flush-mounted lights protected against damage. The lights are automatically turned on whenever the door is opened. They are arranged so as to illuminate the compartment, the doorway, and approximately 100 square feet of ground area near the door.

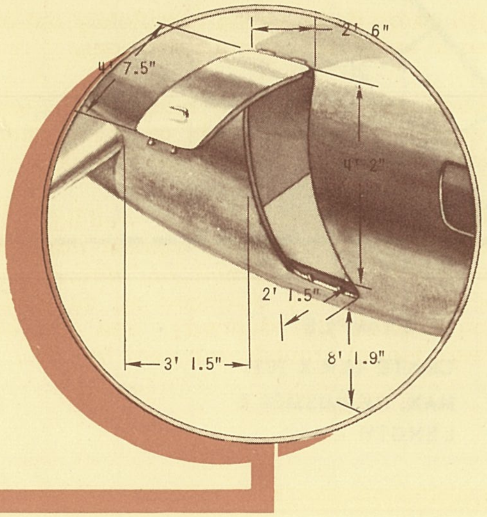
340

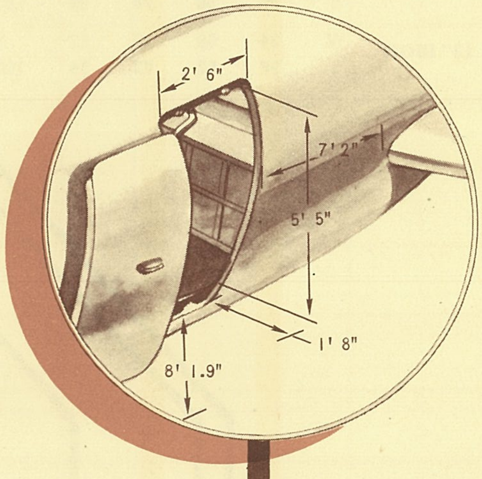
CARGO LOADING DOORS

Locations - Dimensions - Clearances

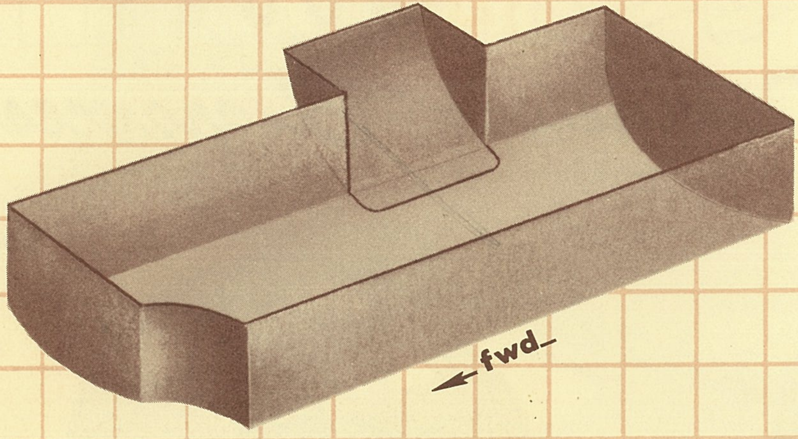








Lower Cargo Compartment

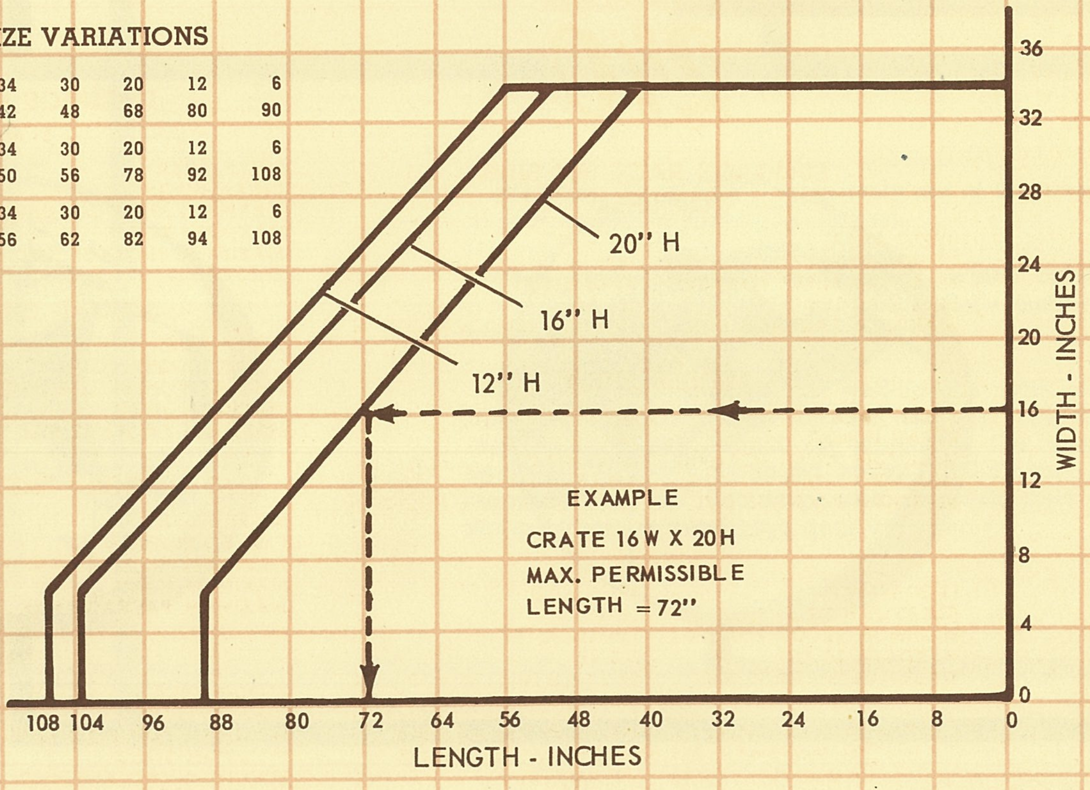


CONVAIR-LINER
340

LOADING DOOR	36" WIDE x 20" HIGH
MAXIMUM FLOOR LOADING	65 LB/SQ FT
MAXIMUM FLOOR LOAD	1000 LB
MAXIMUM VOLUME	77.8 CU FT
MAXIMUM FLOOR AREA	47.4 SQ FT

PACKAGE SIZE VARIATIONS

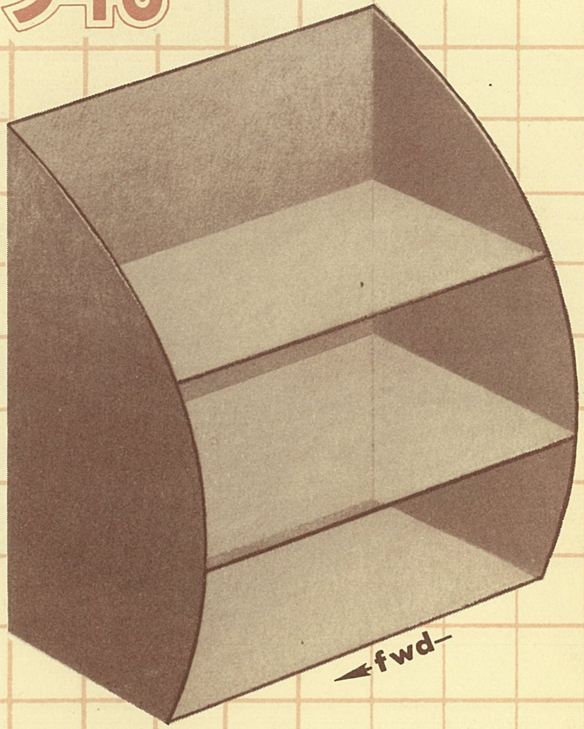
20" HIGH	W	34	30	20	12	6
	L	42	48	68	80	90
16" HIGH	W	34	30	20	12	6
	L	50	56	78	92	108
12" HIGH	W	34	30	20	12	6
	L	56	62	82	94	108



EXAMPLE
CRATE 16W X 20H
MAX. PERMISSIBLE LENGTH = 72"

Luggage Racks

CONVAIR-LINER 340



TOP SHELF

MAXIMUM LENGTH	60"			
MAXIMUM SHELF LOADING	35 LB/SQ FT			
MAXIMUM LOAD	200 LB			
WIDTH	6	12	18	24
HEIGHT	31	28	23	15

MIDDLE SHELF

MAXIMUM LENGTH	60"
MAXIMUM SHELF LOADING	35 LB/SQ FT
MAXIMUM LOAD	300 LB
MAXIMUM PACKAGE SIZE	19" H x 30" W

BOTTOM SHELF

MAXIMUM LENGTH	60"
MAXIMUM SHELF LOADING	100 LB/SQ FT
MAXIMUM LOAD	300 LB
MAXIMUM PACKAGE SIZE	19" H x 25" W

TOTAL LUGGAGE RACK

VOLUME	84.7 CU FT
AREA	13.6 SQ FT

CONVAIR-LINER 240

LUGGAGE RACK (RH SIDE)

TOP SHELF

SHELF AREA	31" x 56"
CLEAR HEIGHT	20½"
MAXIMUM SHELF LOADING	25 LB/SQ FT
MAXIMUM LOAD	225 LB
MAXIMUM PACKAGE SIZE	19½" L x 28½" W x 20½" H

MIDDLE SHELF

SHELF AREA	34" x 56"
CLEAR HEIGHT	19½"
MAXIMUM SHELF LOADING	25 LB/SQ FT
MAXIMUM LOAD	300 LB
MAXIMUM PACKAGE SIZE	31" L x 28½" W x 19½" H

FLOOR

FLOOR AREA	27½" x 56"
CLEAR HEIGHT	19½"
MAXIMUM FLOOR LOADING	150 LB/SQ FT
MAXIMUM LOAD	275 LB
MAXIMUM PACKAGE SIZE	27½" L x 28½" W x 19½" H

Note: With all shelves folded, maximum floor load can be increased to 300 pounds, maximum package size to 19½" L x 28½" W x 62" H.

LUGGAGE RACK (LH SIDE)

TOP SHELF

SHELF AREA	26" x 62"
CLEAR HEIGHT	14½"
MAXIMUM SHELF LOADING	25 LB/SQ FT
MAXIMUM LOAD	175 LB
MAXIMUM PACKAGE SIZE	15" L x 31" W x 14½" H

SECOND SHELF FROM TOP

SHELF AREA	31½" x 62"
CLEAR HEIGHT	14½"
MAXIMUM SHELF LOADING	25 LB/SQ FT
MAXIMUM LOAD	250 LB
MAXIMUM PACKAGE SIZE	27" L x 31" W x 14½" H

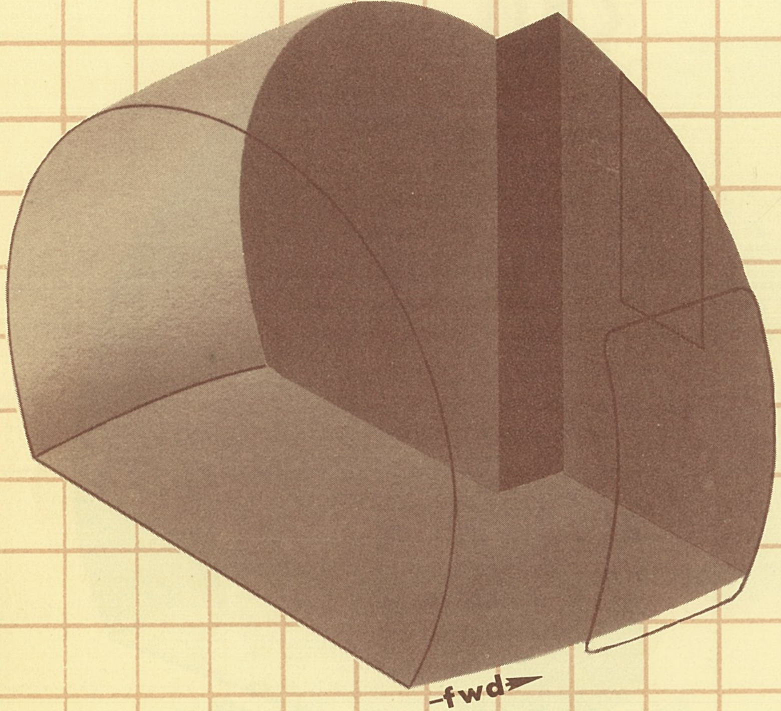
THIRD SHELF FROM TOP

SHELF AREA	32" x 61"
CLEAR HEIGHT	18½"
MAXIMUM SHELF LOADING	25 LB/SQ FT
MAXIMUM LOAD	300 LB
MAXIMUM PACKAGE SIZE	32½" L x 31" W x 18½" H

FLOOR

FLOOR AREA	27" x 61"
CLEAR HEIGHT	14½"
MAXIMUM FLOOR LOADING	50 LB/SQ FT
MAXIMUM LOAD	275 LB
MAXIMUM PACKAGE SIZE	27" L x 31" W x 14½" H

Aft Cargo Compartment

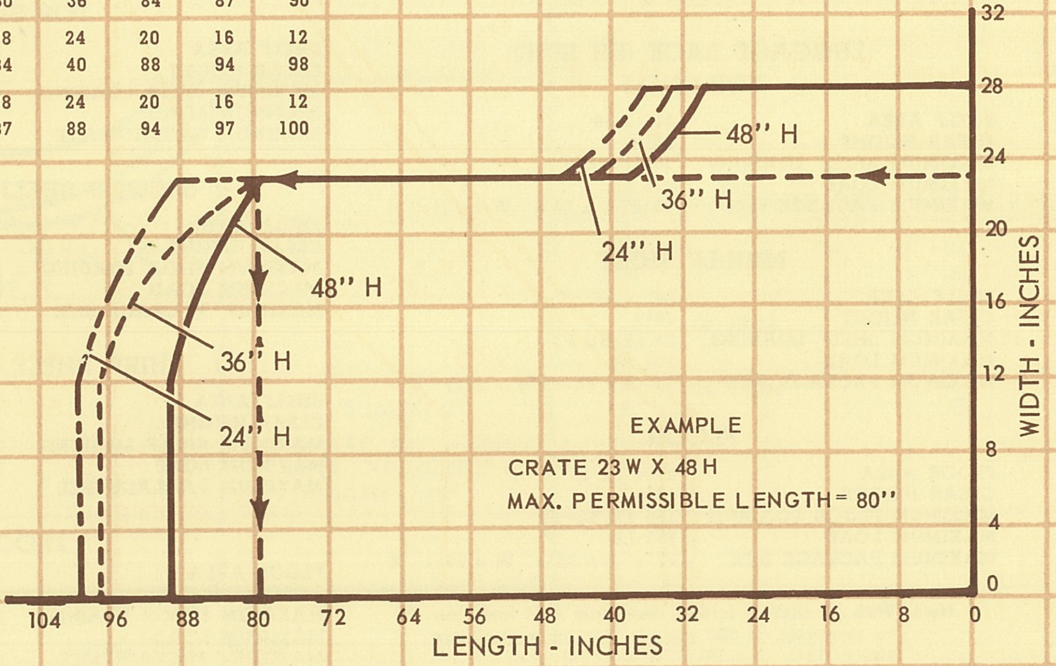


CONVAIR-LINER
240

LOADING DOOR	28" WIDE x 48" HIGH
FLOOR AREA	31.63 SQ FT
VOLUME	192.78 CU FT
MAXIMUM FLOOR LOADING	150 LB/SQ FT
MAXIMUM FLOOR LOAD	1500 LB

PACKAGE SIZE VARIATIONS

48" HIGH	W	28	24	20	16	12
	L	30	36	84	87	90
36" HIGH	W	28	24	20	16	12
	L	34	40	88	94	98
24" HIGH	W	28	24	20	16	12
	L	37	88	94	97	100

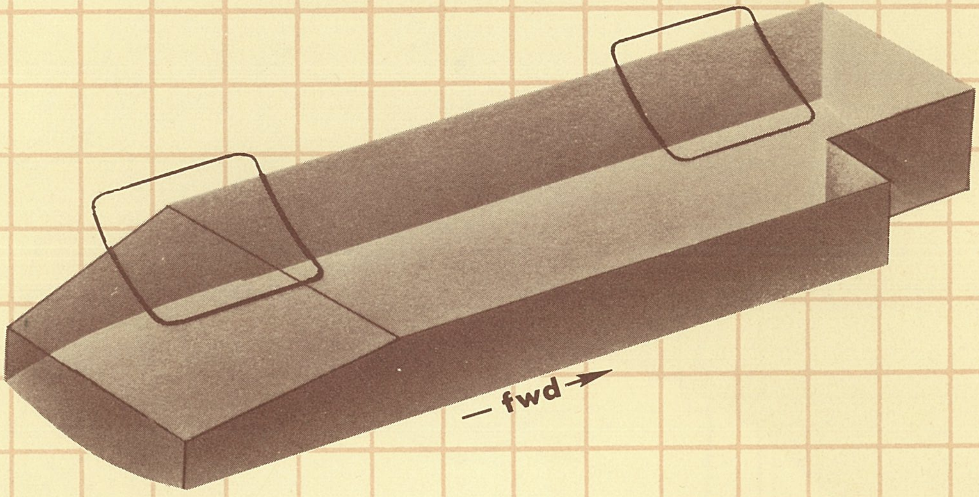


EXAMPLE

CRATE 23 W X 48 H

MAX. PERMISSIBLE LENGTH = 80''

Lower Cargo Compartment

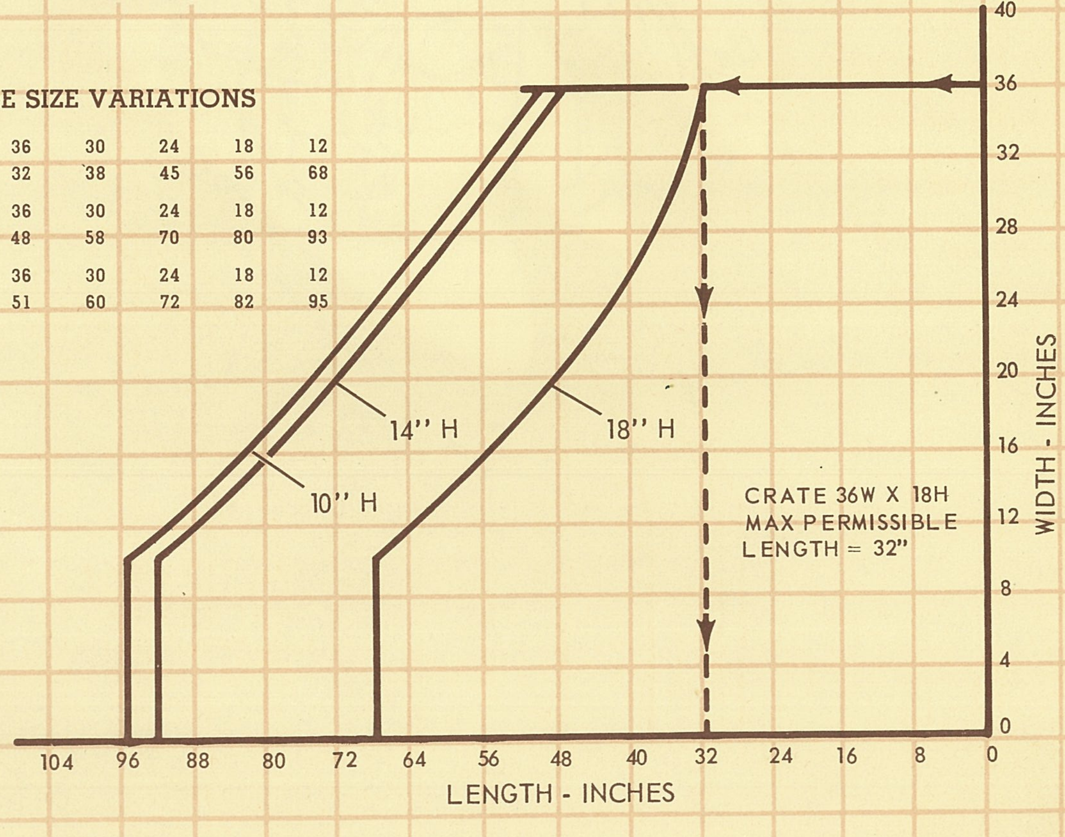


CONVAIR-LINER
240

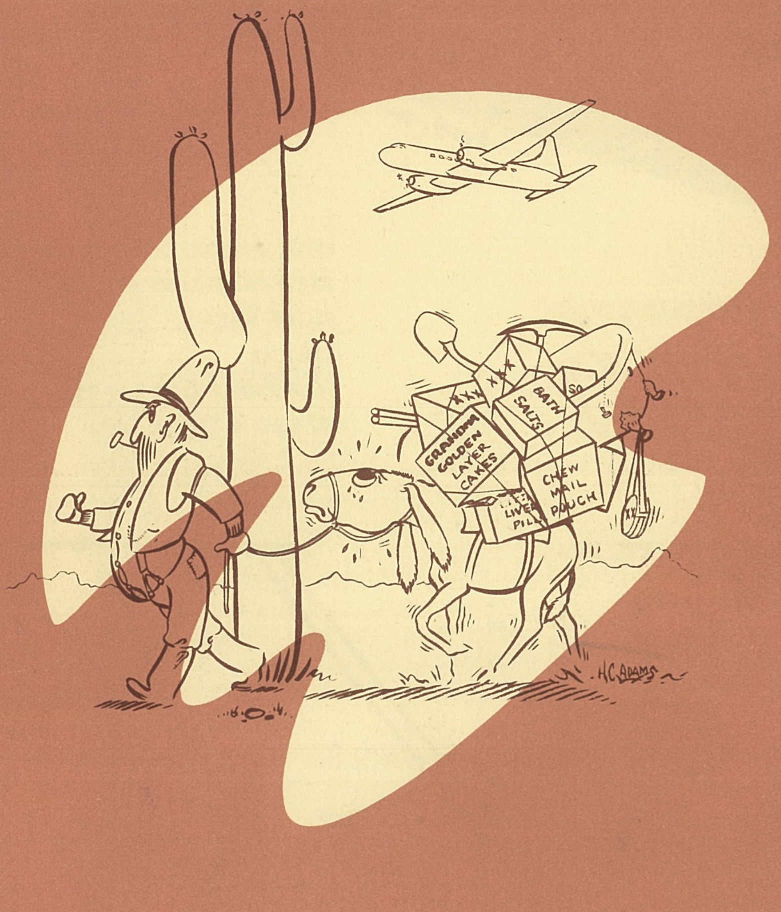
FWD LOADING DOOR	36" WIDE x 20" HIGH
AFT LOADING DOOR	36" WIDE x 20" HIGH
FLOOR AREA	55.39 SQ FT
VOLUME	88 CU FT
MAXIMUM FLOOR LOADING	65 LB/SQ FT
MAXIMUM FLOOR LOAD	1500 LB

PACKAGE SIZE VARIATIONS

18" HIGH	W	36	30	24	18	12
	L	32	38	45	56	68
14" HIGH	W	36	30	24	18	12
	L	48	58	70	80	93
10" HIGH	W	36	30	24	18	12
	L	51	60	72	82	95



CRATE 36W X 18H
MAX PERMISSIBLE
LENGTH = 32"


XXX
XXX
BATH SALTS
GRANDMA GOLDEN LAYER CAKES
CHEW MAIL POUCH
LIVER PILLS
H.C. ADAMS

REPRINTED FROM AVIATION WEEK

Copyright 1954
by McGraw-Hill Publishing Co.

FEATURE PAGE

COCKPIT VIEWPOINT

By Capt. R. C. Robson

Case Against Auto Feathering

Recent crash of a Convair 240 at Buffalo may bring to a head a long-standing feud over automatic propeller feathering. This device became mandatory on 240s in order that the airplane might meet certain single-engine climb specifications of T-category.

It was felt that manual feathering would be too slow for safety. Single-engine-wise, the 240 is a great deal like the DC-3. That is, it will fly nicely on one engine with a couple of "ifs": if sufficient flying speed has been obtained prior to engine failure, and if the propeller is feathered immediately. On either airplane, a windmilling prop will bring the operation to a screeching halt.

▶ **Procedure**—Many DC-3s flew for years with a hydraulic feathering system, operated by a set of four valves in the companionway which, for good reasons, was known as the plumber's nightmare.

For those unfamiliar with the procedure, a feathering was accomplished by: 1. The co-pilot leaving his seat; 2. facing the rear; 3. selecting the appropriate "steam" valve handle; 4. rotating this handle a certain number of turns; 5. observing the propeller and, when the blades had feathered, 6. closing the valve.

The actual maneuver takes considerably longer to complete than to describe—even when the co-pilot chooses the correct handle on the first try.

The point is well taken by both pilots and airline management that if a wonderful safety record could be produced with this type of snafu then the Convair's "push button" feathering, manually operated, can do no worse. Industry-wide there have been somewhere near 400 false, or unwanted, featherings. That is, propellers have been feathered automatically on perfectly normal, healthy engines simply because the automatic gadget went haywire. One airline alone has had nearly 150 falsies against two actual engine-failure featherings—a 75-to-1 ratio.

▶ **Changes Its Mind**—Sometimes, you see, this damnable device not only feathers a good engine but then changes its mind and starts to unfeather it and maybe even repeats the cycle a few times. All of this is hard on the airspeed—what's left of it. Or, for no apparent reason, it may up and feather the good engine, leaving the pilot with one that is really bad.

What's the answer? Why, remove it, of course. Or, more correctly, change it. Instead of having automatic feathering, let's have automatic indication. That is, the device will turn on a light inside the manual feathering button as well as a light (one for each engine, please) over the BMEP gages. Now the pilot will have automatic warning and, if engine instruments, vibration etc. indicate the need, he can have instant feathering simply by depressing the lighted button.

The reason for having two separate lights, besides guarding against bulb failure, is an attempt to provide at least one light that the pilot can see. Ambient light conditions being what they sometimes are in the cockpit, it occasionally is necessary for a pilot to cup his hands around a warning light to make sure that it really is lit. Just about the time you find all this is true, you may also find yourself on single engine.

▶ **Change Needed**—Earlier, I said there was somewhat of a feud over this item. Actually, it is more in the nature of a fume by the users. All concerned—pilots, airlines, many CAA safety agents and CAB personnel, and others—have long agreed that a change is needed.

But this agreement hasn't changed the official rule still on the books. Of course, many pilots have been doing something about it by keeping the automatic feathering turned off. They reason that they would just as soon be illegally alive—if its all the same to CAB.

AVIATION CALENDAR

Feb. 22-23—Seventh annual National Model Plane Exhibit Contest, sponsored by Air Foundation and Cleveland Chamber of Commerce, Higbee Co. auditorium, Cleveland.

Feb. 24-26—Ohio-Indiana Agricultural Aviation Conference, Ohio State University, Columbus, Ohio.

Mar. 5-7—Society of Women Engineers, national convention, Mayflower Hotel, Washington, D. C.

Mar. 22-25—Institute of Radio Engineers national convention, Waldorf-Astoria Hotel and Kingsbridge Armory, New York.

Mar. 29-31—Aero Medical Assn., 25th annual meeting, Statler Hotel, Washington, D. C.

Apr. 5-6—Society of the Plastics Industry (Canada), Inc., 12th annual conference, Mount Royal Hotel, Montreal.

Apr. 5-8—American Management Assn., 23rd National Packaging Exposition, Convention Hall, Atlantic City, N. J.

Apr. 12—Society of Automotive Engineers, second annual Aeronautic Production Forum, Hotel Statler, New York.

Apr. 14—National Advisory Committee for Aeronautics, symposium on helicopter research for American Helicopter Society, Langley Field, Va.

Apr. 14-16—Society for Experimental Stress Analysis, spring meeting, Netherlands Plaza Hotel, Cincinnati.

Apr. 19-20—Symposium on automatic production of electronic equipment, sponsored jointly by Stanford Research Institute and USAF, Fairmont Hotel, San Francisco.

Apr. 21-24—Second annual student paper competition for undergraduates and graduates, sponsored by Institute of the Aeronautical Sciences (Texas Section), Melrose Hotel, Dallas.

Apr. 22-23—Joint meeting of Radio Technical Commission for Aeronautics, Franklin Institute Laboratories, Institute of the Aeronautical Sciences (Philadelphia Section) and Institute of Radio Engineers (Philadelphia Section), Philadelphia.

Apr. 22-23—American Institute of Electrical Engineers, conference on feedback control, Claridge Hotel, Atlantic City, N. J.

Apr. 29-30—American Society of Tool Engineers, 10th biennial industrial exposition, Convention Center, Philadelphia.

May 3—Invention Exhibit & Conference, Cleveland Engineering Society building, Cleveland.

May 4-6—1954 Electronic Components Symposium, Department of Interior auditorium, Washington, D. C.

May 5-7—Third International Aviation Trade Show, managed by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

May 5-7—American Welding Society, second Welding & Allied Industry Exposition, Memorial Auditorium, Buffalo, N.Y.

May 16-19—American Association of Airport Executives, convention, Louisville, Ky.

May 17-20—Basic Materials Conference, produced by Clapp & Poliak, Inc., International Amphitheater, Chicago.

LETTERS

Insurance & Nonskeds

Your Mar. 15 article on insurance, p. 323, was timely reporting. . . . When the New York State Court of Appeals ruled that an airport vending machine insurance company must pay off on a passenger killed in a non-scheduled airline crash, it was doing its duty to the public. While the vending machine policies specifically state that they do not cover non-scheduled airline flights, it would be interesting to know how many people have put their money in the machine, written out their insurance, and gone blissfully on their non-scheduled flight, thinking they were covered. As a matter of fact, all that had transpired was that some small fine print, and a very reassuring looking machine, had hooked them out of a quarter.

In view of this decision, perhaps the insurance company will set up two machines, scheduled and non-scheduled, with the rates adjusted to what experience has shown the risks to be. Under this condition, I don't think the average layman would long continue to have trouble with the definition of the terms scheduled and non-scheduled.

John R. Chewning
1635 Lydia Ave.
Elmont, N. Y.

Auto Feathering

This time, I believe, Capt. Robson has gone too far in his philosophizing about things aeronautical ("Case Against Auto Feathering," Aviation Week Feb. 22, p. 112) . . .

His stand on the value of the auto-feather installation of the Convair is not only archaic but downright dangerous! . . .

I am a captain in the USAF, an instructor in the Convair and have accumulated 7,000 hours in various and sundry type machines. . . .

Prior to my recall into the service last July, I was an executive pilot—and had been since 1945. . . .

Several weeks ago I delivered an aircraft to Miami and rode the commercial route back to Houston—in a Convair.

Naturally, one pilot will talk to another so I started a conversation with the pilot of the airliner regarding the Convair, his likes, dislikes, etc., during which he showed a glaring ignorance regarding the auto-feather feature on his machine. He not only didn't think much of it but was under the impression that his props had to be in low lights before it would work.

Later on, his co-pilot gave me the word on the gimmick but he claimed that the props had to be in hi-lights. . . . Two men on the same plane with two different ideas! . . .

Now, I'll wager that the good Capt. Robson could not tell me, in time, which engine failed, should he have one give out on takeoff. At least, not soon enough to be able to do anything about it! With all of the lights, of various types, in the cockpit of the Convair he wants to add to them by prop warning lights of some sort. Phooey!

The clincher to the good captain's argument is the number of falsies he claims has happened. Well, that may be so, but I'll counter that with a few figures of our own. . . . Here at Ellington AFB we have never had an inadvertent feather and we are flying in excess of 150 missions each day, plus four ships in transition. The transition boys are shooting in the neighborhood of 60 landings each per day, by the way!

And not only that, but I have never read an Air Force report of any happening to the T-29 as we call them. And we have over 300 in service!

Really, Captain, let's keep it in the vein we know or do it for laughs like Hi Sheridan!

No, you needn't cancel my subscription. I not only enjoy your magazine but intend to have it delivered as long as it is printed.

Melville W. Missall, Capt., USAF
714 Ruell St.
Houston, Tex.

P. S. How does he feel about the torque meter? The DC-3s didn't have them either so they shouldn't sit too high in the good captain's esteem!

The Turbo Compound

I was extremely interested in your article Feb. 8, reporting on American Airlines DC-7 "Teething Trouble."

I personally feel that the Wright R3350 Turbo Compound engine should not necessarily be considered a "new-type powerplant," as inferred in your article. Perhaps they are to American Airlines, but I believe it is general knowledge in the industry that the engines have been flying in Lockheed P2Vs since 1949 and Lockheed Super Constellations since early 1952. This certainly takes them out of the "new-type powerplant" category and also means a lot of bugs were taken out prior to American Airlines use.

Your article also spoke of Wright devising a fix for increasing the strength at the intersection of the exhaust nozzle with the nozzle box casting by installing a reinforcing doubler and gusset at that point. We at Lockheed have been touting Wright for almost two years for this same fix for another reason in addition to the one noted above. We are glad to see a public admission that some action finally has been taken.

The article was very informative and interesting to the writer who has been closely associated with Turbo Compound powerplants since their early introduction on the Lockheed P2V, and subsequently the Lockheed Super Constellation, which of course we believe to be the finest four-engine transport of its type available in the world. I sincerely hope your magazine publishes similar informative articles in the near future of other airlines' experiences with Turbo Compound engines in our Lockheed Super Constellations.

Austin Wickwire,
Lockheed Engineering Rep.
Chula Vista, Calif.

Engineers & Jobs

Your News Sidelights column commented Jan. 18 on "Why aircraft engineers change jobs."

Please refer your recruiter friend to a recent and reputable text titled "Executive Action," by Learned, Ulrich and Booz, published by the Harvard Business School, 1951.

If he will turn to page 75 he will find a more logical explanation of why junior professional men in general who are seeking success change jobs.

Let me quote:

"At the more junior levels, the sudden discovery that 'success' may entail long years of apprenticeship in an established company leads often to an acute sense of frustration. This attitude is most likely to develop when the younger man has put in a good many years of preparation at the college or graduate level in the hope that it will pay off in accelerated progress when he goes to work.

"Yet the odds against starting a new venture without capital and making a go of it are so great as to induce many energetic and capable younger men to stay within the established limits of older companies. The inevitable result is that the more ambitious of the younger men may shift from company to company with a frequency which leads their elders to regard them as restless or irresponsible. Such shifting may, however, be their only effective means of improving the odds on success."

Although aircraft engineers were not being specifically considered in the above quotation, I believe the situation applies.

W. B. Howard
550 11th Ave., W.
Kirkland, Wash.

Lots of Zeroes?

I want to take exception to Stuart Symington's remarks regarding "thousands of Zero fighters prior to World War II" (Feb. 22 issue, page 13): Mr. Symington has been misinformed.

Japan had produced 444 Zeke fighters up to Dec. 1, 1941. Mitsubishi had produced all but 1 of these. The Zeke (A6M-1) II had been accepted in 1939, but failed in carrier tests.

Only 3 prototypes were produced that year.

The machine was finally accepted in the summer of 1940 as a carrier fighter and 98 aircraft were produced that year. So, actually, the Zeke had been in squadron service only a year and could not possibly have been produced by the "thousands."

A sum total of 10,934 Zeke type "O" aircraft were produced from its inception: Mitsu, 3,879; Nakajima, 6.215. Nakajima also built 323 "Rufes," which was a float-plane version.

Hitachi and the 21st Naval Air Depot built 517 Zeke Jrs., which was a two-seated fighter trainer version.

M. A. Salo,
8824 Songfest Drive
Rivera, Calif.

FEATURE PAGE

COCKPIT VIEWPOINT

By Capt. R. C. Robson

Prop Problems—or, Flat-World Thinking

The remarks made here on automatic propeller feathering (Aviation Week Feb. 22) prompted comments from aviation people which ranged from here to there. My evaluation of this device, in case you just tuned in, can be summed up: "It stinks." Since that writing, this gadget, true to form, has failed several more times.

Hand-in-hand with the feathering proposition is the case against "automatic" propeller reversing. This subject produced some trying days in the airline industry a few years back when some unwanted reversals caused nasty black headlines. At that time, the short-circuiting culprit was soon isolated. But another—and more important—problem remains. It is caused by an entirely different kind of short circuiting, one that is most aptly described as a "flat world" mentality.

▶ **Didn't Add Up**—This term needs a bit of explaining. A thousand years or so ago, leading scholars and geographers believed they lived on a flat world. This thinking raised hob with things in general—navigators couldn't seem to arrive at the places they aimed for, actually couldn't even aim—because the calculations just didn't add up. So transportation, and consequently life, stayed put.

Today's aviation world still is hampered now and then by this same type of "dead reckoning." This brand of thinking—and I use the word loosely—produces theories which adversely affect many things, in this instance propeller reversing.

As the situation stands, the reverse lock mechanism is actuated by a micro-switch on one or more landing gear struts. Strut compression after landing closes the switch. For many reasons this system is far from foolproof. The delicate plunger and spring components are subject to considerable jarring each time several tons of airframe contacts the runway at high speed, and the unfavorable physical location, with its exposure to all manner of foreign matter, makes for a certain amount of disorder.

▶ **How They Occur**—Reversals continue to occur in the air because of haywire operation. Hard landings, followed by bounces, have broken the backs of several aircraft when reversal occurred on the ground and continued to the crest of the bounce, and many times the device fails to unlock after landing, whereupon there ensues a wild cockpit scramble to grab the manual override.

With all this nonsense, one would suppose the sensible solution would be to eliminate this "automatic" unlock in favor of a manual one.

Now picture, if you will, a typical cockpit. Notice the number of lethal weapons the pilot already has at, or for, his disposal. The gear can be pulled up at the ramp; switches or mixtures can be cut on takeoff; deicers left off in icing conditions, or the pilot can dive at top speed into thunderstorms, mountains or buildings for he has easy access to the stick and throttles.

▶ **Many Combinations**—In short, there are a hundred disaster-producing combinations. But do you know something? Relatively few pilots engage in this type of sport. Yet some in CAB still insist that giving the pilot one additional gadget is dangerous. Really, fellows!

Please note that the argument is not being made that I am against automatic devices per se. But if an automatic device has proved itself erratic and, therefore, dangerous, it is foolish to refuse a change by saying that the pilot is incapable of proper operation. Automatic devices can be better than humans, if they work properly and are fail safe. If not, they can be worse. But flat-world thinking can be even worse.

AVIATION CALENDAR

Apr. 29—Institute of Navigation, eastern regional meeting, Friendship International Airport, Friendship, Md.

May 5-7—Third International Aviation Trade Show, managed by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

May 6-8—Institute of the Aeronautical Sciences, first annual West Coast Industry-Faculty Conference and fourth annual West Coast Student Conference, Los Angeles.

May 7-8—National Intercollegiate Flying Assn., air meet, University of Illinois, Urbana, Ill.

May 10-12—Institute of Radio Engineers, National Conference on Airborne Electronics, Biltmore Hotel, Dayton, Ohio.

May 10-13—Society of Aeronautical Weight Engineers, 11th annual conference, Lord Baltimore Hotel, Baltimore.

May 11—Daniel Guggenheim Medal Board of Award, annual meeting for preliminary selection of 1954 candidates, Engineering Society Building, New York.

May 14-17—American Volunteer Group (Flying Tigers), biennial reunion, Belmont Plaza Hotel, New York.

May 16-19—American Association of Airport Executives, convention, Louisville, Ky.

May 17-18—National Fire Protection Assn., Aviation Seminar, Hotel Statler, Washington, D. C.

May 17-20—Basic Materials Exposition and Conference, International Amphitheater, Chicago.

May 20—Women's National Aeronautic Assn., 1954 Skylady Derby for stock model aircraft of 300 hp. or less, Raton, N. M. to Kansas City, Mo.

May 21-22—Operations Research Society of America, second annual meeting, Edgewater Beach Hotel, Chicago.

May 21-23—Texas Private Fliers Assn., state convention, Galvez Hotel, Galveston.

May 24-26—National Telemetering and Remote Control Conference, sponsored by IRE, AIEE, IAS and ISA, Morrison Hotel, Chicago.

May 31-June 11—Canadian International Trade Fair, to be held in conjunction with the National Air Show and Canada's Aviation Day, Toronto.

June 2-4—Triennial industry inspection of NACA's Lewis Flight Propulsion Laboratory, Cleveland, Ohio.

June 5—Fifth annual Maintenance and Operations Clinic, sponsored by Reading Aviation Service, Inc., Reading Municipal Airport, Reading, Pa.

June 5-12—Philadelphia Junior Chamber of Commerce, second annual Transcontinental Air Cruise for stock model aircraft of 300 hp. and less, Philadelphia to Palm Springs, Calif.

June 9-11—American Society for Quality Control, eighth annual convention, Jefferson Hotel, St. Louis.

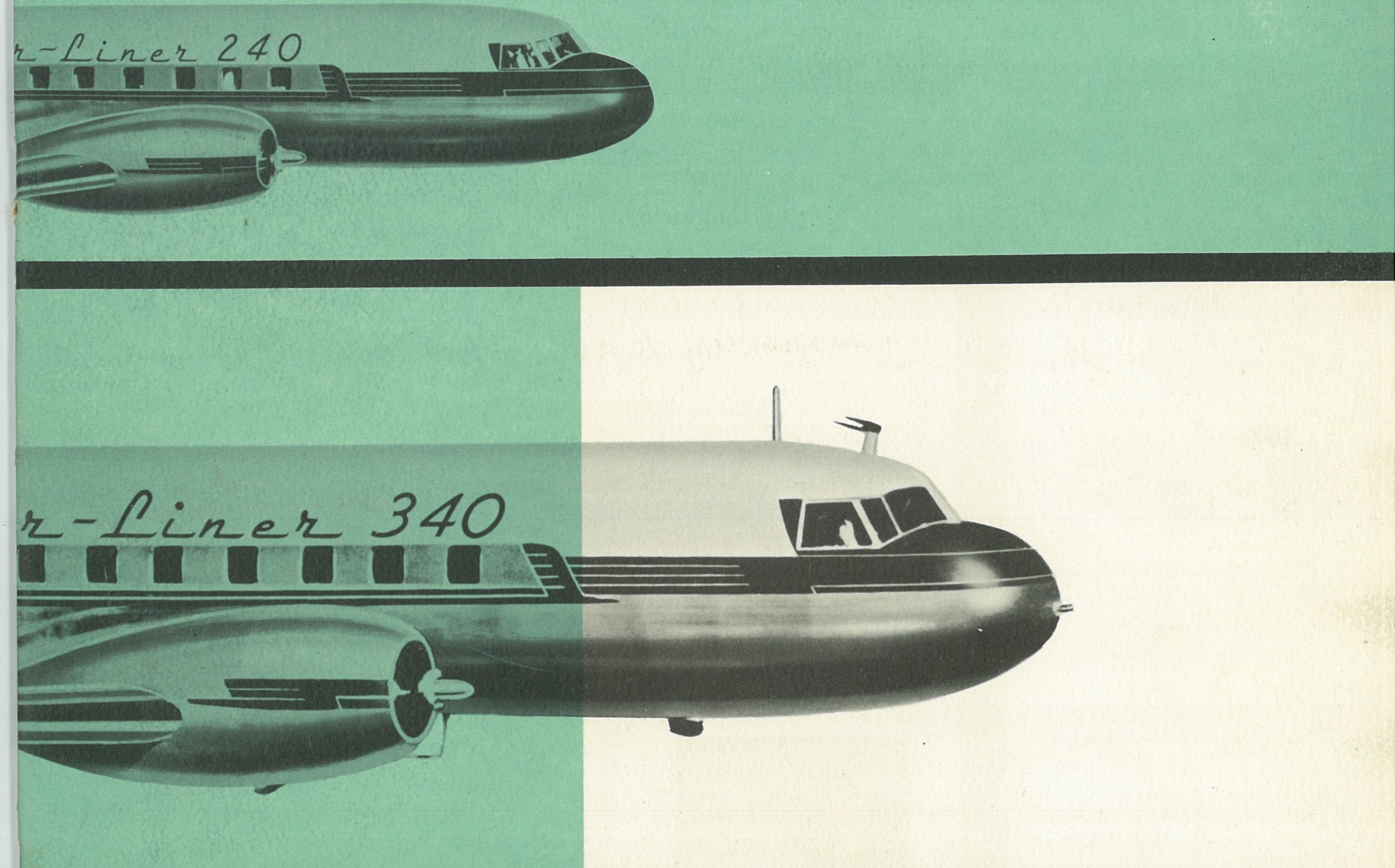
June 21-24—Institute of the Aeronautical Sciences, annual summer meeting, IAS Building, Los Angeles.

June 24-26—American Helicopter Society, 10th annual forum, Washington, D. C.

Sept. 4-6—National Aircraft Show, Dayton, Ohio.

ANX
34

Convair
TRAVELER



Anniversary Issue · *May 1954*

Convair TRAVELER

MAY 1954
VOLUME VI
NUMBER 1

FOREWORD

In the past year Convair-Liners took another big leap in route miles with the delivery of 104 Convair 340's, making a total of approximately 590 Convair-Liner type aircraft in service. In the six years since the first Convair-Liner 240 made its initial flight, many changes have been made—not only in the airplane, but in its ownership. We've tried to cover these changes in this issue and to bring you up-to-date on all Convair-Liner type aircraft.

Chief Engineer
F. W. Fink

Chief of Service
J. J. Alkazin

Editor
G. S. Hunter

ON THE COVER

Artist Don Wikle planned a fitting cover for our theme, "Convair-Liners in Review."

A digest of Convair-Liner operation and service published monthly by the Service Publications Section of Convair in the interest of Convair-Liner operators and for the promotion of sales and service. Communications should be addressed to Chief of Service, Convair, San Diego 12, Calif.

The information published in the Convair TRAVELER is to be considered accurate and authoritative as far as Convair approval is concerned. CAA approval, however, is not to be implied unless specifically noted. Airline personnel are therefore advised that use of this material may be restricted by their respective company policies or by CAA publications. Permission is hereby granted to republish any information here presented, but it is suggested that the material be verified with Convair to insure that it conforms with latest changes and developments.

Copyright 1954

CONSOLIDATED VULTEE AIRCRAFT CORPORATION • SAN DIEGO, CALIFORNIA

CONVAIR·LINERS *In Review*

CONVAIR is the name of an airplane—it may be a 240 or a 340. CONVAIR is also the name of the manufacturer of the popular Convair-Liner transports. It is the people who make the CONVAIR and those who represent the manufacturer. It is a tradition that grows in eminence with every airplane, with every passenger mile flown. CONVAIRS, as they are known to airline operators and to the flying public, operate on six continents and in islands in the Pacific . . . over all types of terrain and through all kinds of weather. They fly regularly-scheduled over-water routes. The Convair-Liner, because of its excellent single-engine characteristics and range, permits flying over many routes that are normally flown by four-engine equipment. To follow the network of its expanding routes requires a background of geography. Its low-drag type airfoil provides a high degree of lift which makes the airplane ideally suited for operation in the tropics where it is necessary to climb quickly above unstable air for smooth over-weather flying. This airfoil, plus single-engine characteristics, permits faster climbing to clear obstacles which encircle many airports. Its operating ceiling, coupled with a pressurized cabin, enables it to fly over, not around, most mountain ranges on its network of operations. This ability to overcome geographic limitations results in a considerable saving of time. Some Convair-Liners, which operate from mountain-surrounded high-altitude airports, are equipped with jet assist to provide added thrust and the climb required in event of an engine failure at high-altitude takeoff. Utilization of engine heat provides heated air for wing and tail anti-icing and for cabin heating, thus permitting year-round operation in the northern hemisphere. Several internationally known companies, that find it practical and profitable to operate their own airplanes for business, have purchased executive type CONVAIRS. The USAF has purchased an undisclosable number of Convair-Liner 240's and 340's. Some of these will be used as bombardier and navigational trainers. These "flying classrooms" provide training conditions that simulate actual military missions in modern high-altitude bombers. Another version, the "Flying Samaritan" air evacuation transport, is equipped with modern facilities for airborne medical treatment and comfort. These, plus all other purchasers of Convair-Liner type aircraft, number 46 with operational bases scattered over the four corners of the world. Thus, with CONVAIRS operating from hundreds of airports throughout the world, distance is no longer a problem in the servicing and maintenance of these aircraft.

CONVAIR·LINER

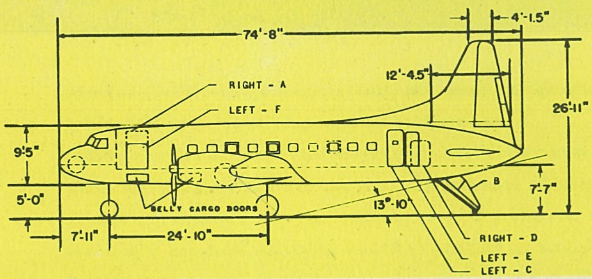
240

Configurations

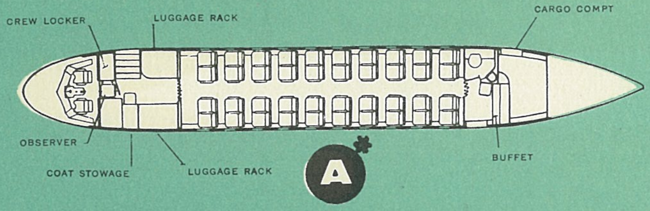
On March 16, 1947, America's first peacetime pressurized twin-engine commercial transport, the Convair-Liner 240, successfully completed its initial flight. This 40-passenger transport with improved range, payload, performance, and the latest advancements in aircraft safety, was needed to replace war-weary aircraft which were reaching the retirement age. Every effort was made to incorporate in the new transports the aerodynamic advances developed during the war years, and the postwar requirements of airline operators.

In their six years of operation, Convair-Liners have flown over four billion passenger miles. This figure is conservative, being based on a load factor of approximately 60 per cent. The number of takeoffs made by these aircraft has passed the two million mark, with American Airlines having made its millionth takeoff in March of this year.

Three basic types of this first Convair-Liner are in operation throughout the world. They differ chiefly in the location and type of passenger entry, buffet, baggage, and cargo compartments. These three types, plus noteworthy design details, are listed in the tabulation.

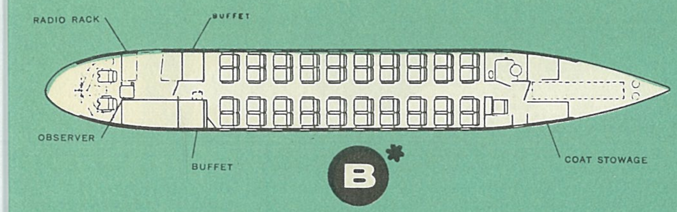


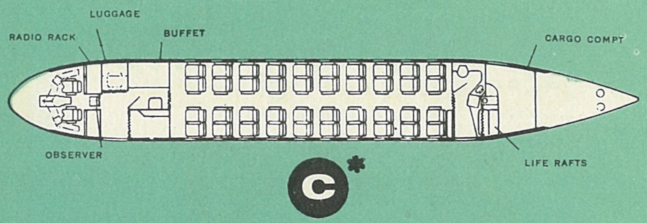
*	AIRLINE	PASSENGER INTEGRAL	ENTRANCE DOOR	SERVICE DOOR	CARGO DOOR - D	AUXILIARY DOOR - E
A	AA	A		C	YES	
B	WAL	B		A		YES
C	PAA		C	F	YES	
A	CPA	A		C	YES	
C	KLM		C	F	YES	
B	TAA	B		A-E		YES
A	AA (FAMA)	A		C	YES	
B	ORIENT	B		A		YES
C	SWISSAIR		C	A	YES	
C	SABENA		C	A	YES	
A	NEA	A		C	YES	
A	CATC	A		C	YES	
A	GARUDA	A		C	YES	
A	ETHIOPIAN	A		C	YES	
C	LAI		C	F	YES	



EQUIPMENT	AA	WAL
Engine Type P&W	R2800-34	R2800-CB16
Propellers	HSP Dural	HSP
Batteries	2 in Wing	1 in Wing
NESA Glass	Main & DV	Main Panels
Outer Panel Tanks	No	No
Incr Gross Wt	Yes	Yes
Entrance	Fwd RH Integral	Aft Integral
Service Door	LH Aft	RH Fwd
Auxiliary Door	No	Yes
Buffet	Aft Single Unit	Fwd Double Unit
Radio Operator	No	No
Fuel Dumping	No	No
Cowl Flaps	Top	Top & Bottom
Total Cargo cu/ft	419.5	244

EQUIPMENT	ORIENT	SWISSAIR
Engine Type P&W	R2800-CA18	R2800-CA18
Propellers	HSP	C-E
Batteries	1 in Wing	2 in Wing
NESA Glass	Main Panels	Main Panels
Outer Panel Tanks	No	No
Incr Gross Wt	Yes	Yes
Entrance	Aft Integral	LH Aft
Service Door	RH Fwd	RH Fwd
Auxiliary Door	Yes	No
Buffet	Fwd Double Unit	Fwd Double + Bar
Radio Operator	Yes	Yes
Fuel Dumping	Yes	Yes
Cowl Flaps	Top	Top
Total Cargo cu/ft	215	409





PAA	**CPA**	**NEA**	**KLM**	**TAA**	**AA (fama)**
R2800-CB16	R2800-CA18	R2800-CA18	R2800-CA18	R2800-CA18	R2800-CA15
HSP	HSP	C-E	HSP	HSP	HSP
2 in Wing	2 in Wing	2 in Wing	2 in Wing	2 in Wing	2 in Wing
Main Panels	Main & DV	Main & DV	Main & DV	Main Panels	Main Panels
No	No	No	No	No	No
No	Yes	Yes	Yes	Yes	No
LH Aft	RH Fwd Integral	RH Fwd Integral	LH Aft	Aft Integral	RH Fwd Integral
LH Fwd	LH Aft	LH Aft	LH Fwd	RH Fwd	LH Aft
No	No	No	No	No	No
Fwd Double Unit	Aft Single Unit	Aft Single Unit	Fwd Double Unit	Fwd Double Unit	Aft Single Unit
Yes	No	No	Yes	No	Yes
Yes	No	No	Yes	No	No
Top & Bottom	Top	Top	Top	Top	Top
242	419.5	419.5	322.5	353.5	348

SABENA	**CATC**	**GARUDA**	**ETHIOPIAN**	**LAI**
R2800-CA18	R2800-CA18	R2800-CA18	R2800-CA18	R2800-CA18
HSP	C-E	C-E	C-E	HSP Dural
2 in Wing	2 in Wing	2 in Wing	2 in Wing	1 in Fuselage
Main Panels	Main & DV	Main & DV	Main & DV	Main Panels
No	No	Yes	Yes	No
Yes	No	Yes	Yes	Yes
LH Aft	RH Fwd Integral	RH Fwd Integral	RH Fwd Integral	LH Aft
RH Fwd	LH Aft	LH Aft	LH Aft	LH Fwd
No	No	No	No	No
Fwd Double Unit	Aft Single Unit	Aft Single Unit	Aft Single Unit	Fwd Double Unit
Yes	No	No	No	No
No	No	No	Yes	No
Top	Top	Top	Top	Top
421.5	419.5	419.5	419.5	424

Note

Figures in this tabulation were compiled from original configuration and from Convair's knowledge of service bulletin incorporation. Changes made by the operator without Convair's express knowledge may not be incorporated.

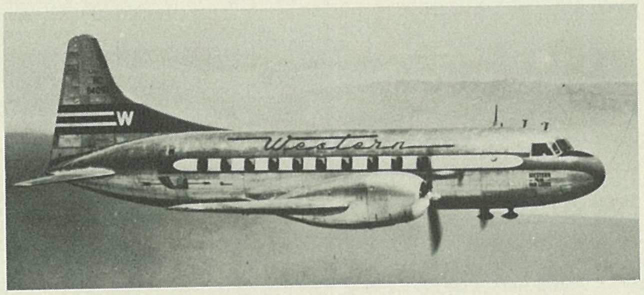
Reviewing the 240

AA American Airlines
Main Base: La Guardia Field, N. Y.
Operating Routes: Continental U. S.

This airline was the first to accept delivery of Convair 240's. The millionth takeoff with AA's Convairs was made in March of this year.

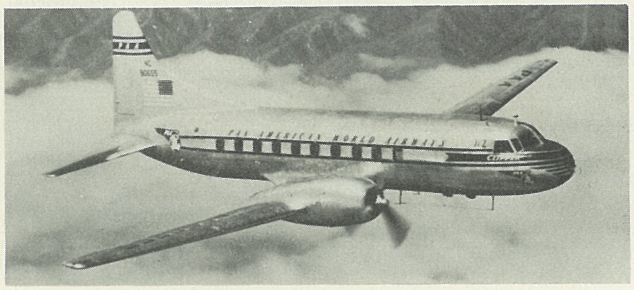
WAL Western Airlines
Main Base: Los Angeles, California
Operating Routes: Western U. S.

WAL was the first airline to use an all modern fleet (Convairs) on the Pacific Coast, enabling the airline to advertise "the fastest flights on the coast."



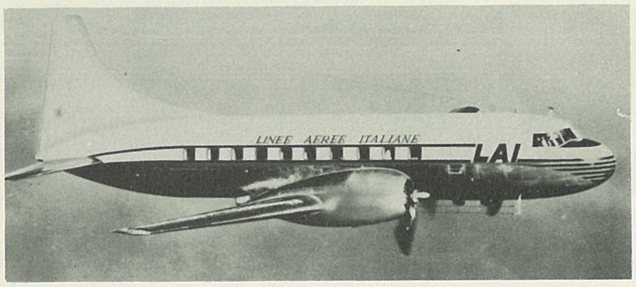
NEA Northeast Airlines
Main Base: E. Boston, Mass.
Operating Routes: New England

This airline, familiarly known as the Yankee Fleet, recently purchased four 240's from another operator to supplement its fleet of Convairs.



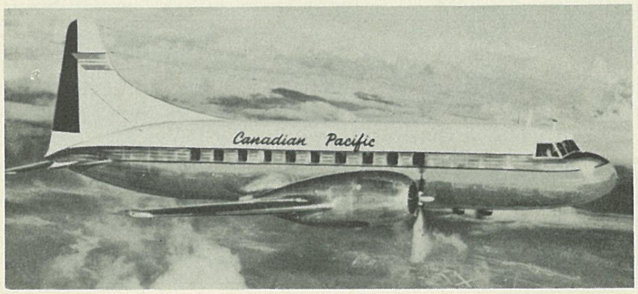
PAA Pan American World Airways System
Main Base: Miami, Florida
Operating Routes: Caribbean Area, Central America, South America

All Convair-Liners are in PAA's Latin American Service.



LAI Linee Aeree Italiane
Main Base: Rome, Italy
Operating Routes: Europe

In five years (1947 to 1952) passengers carried by LAI increased more than 250%. Aircraft were purchased from MCA.



CPA Canadian Pacific Airlines
Main Base: Vancouver, B.C., Canada
Operating Routes: Western Canada, Yukon

This airline is the newest of the Convair 240 operators. Their aircraft were purchased from Continental Air Lines when CAL took delivery of Convair 340's.

KLM Royal Dutch Airlines
Main Base: Amsterdam, Holland
Operating Routes: Europe

This operator has purchased Convair-Liner 340's to supplement their fleet of 240 aircraft.

AA Aerolineas Argentinas

Main Base: Buenos Aires, Argentina

Operating Routes: South America

Four airlines, formerly operating in Argentina, have been nationalized into one large carrier. This airline also operates Convair 240's, which were originally purchased under the banner of FAMA.

ORIENT Orient Airways

Main Base: Karachi, Pakistan

Operating Routes: Pakistan, India, and Burma

Pakistan's only passenger airline has three operating divisions with headquarters at Karachi, Calcutta, and Peshawar.

SWISSAIR Swiss Air Lines

Main Base: Zurich, Switzerland

Operating Routes: Europe

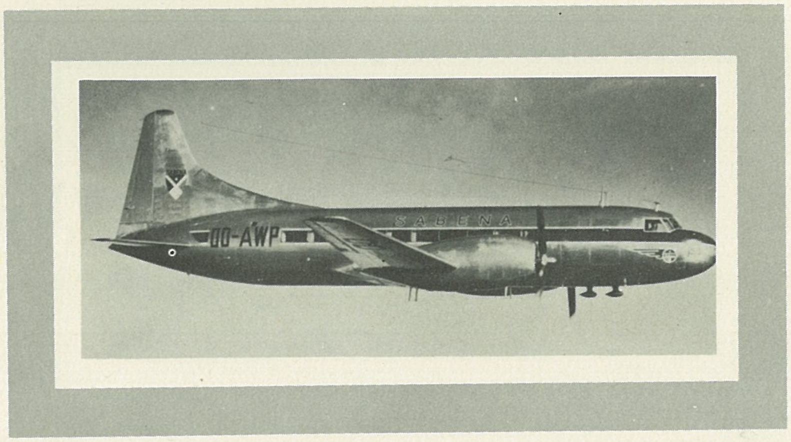
Swissair's location makes it a vital part of European air traffic network. This airline purchased three Convair 240's from KLM to take care of expanding routes.

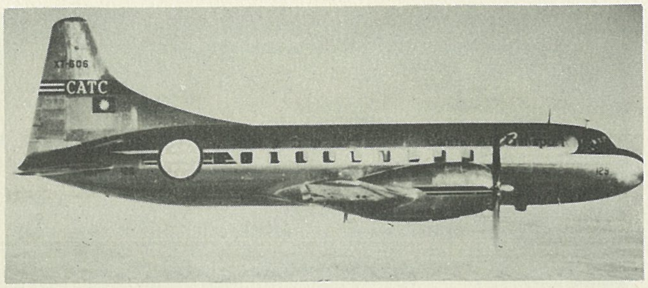
SABENA Belgian Airlines

Main Base: Brussels, Belgium

Operating Routes: Europe

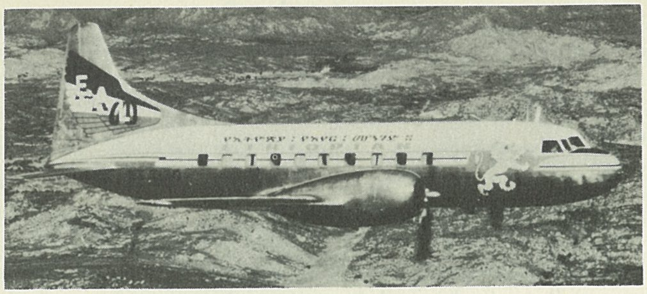
SABENA, one of the world's oldest airlines, ranks seventh among airlines of the world on a route basis. Convair routes extend from Brussels to main capitals of Europe.





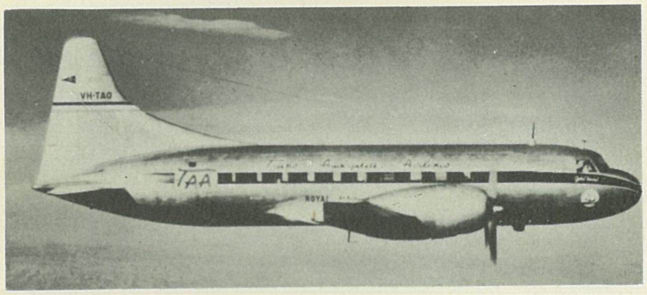
CAT Central Air Transport
Main Base: Shanghai, China
Operating Routes: Formosa and South Coast of China

During internal strife in China, airplanes were withdrawn to Hong Kong and held in custody by British Govt., awaiting determination of ownership. They were awarded to Gen. C. L. Chennault, President of CAT.



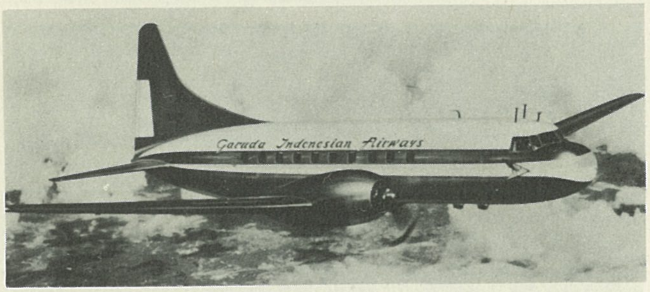
EAL Ethiopian Airlines
Main Base: Addis Ababa, Ethiopia
Operating Routes: Middle East

EAL's airplanes are equipped with "jet assist" to provide additional power for operation from high-altitude mountain-surrounded airports over this operator's routes.



TAA Trans-Australia Airlines
Main Base: Melbourne, Australia
Operating Routes: Australia

One of TAA's Convairs reached the one-millionth passenger mile 7 months after delivery. It averaged 8.93 block hours/day at a 92% load factor. Another was the first to complete 10,000 flight hours.

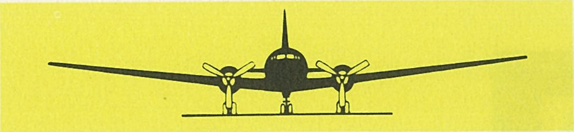


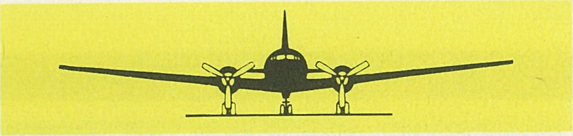
GARUDA Garuda Indonesian Airways
Main Base: Djakarta, Indonesia
Operating Routes: Indonesia and international routes from Bangkok, Thailand, and Manila, P. I. to Darwin, Australia

These 240's were first to be equipped with long range fuel tanks. Convair 340's supplement Garuda's fleet of 240's.

Reviewing the 340

At first glance, the Convair 240 and 340 appear to be "look alikes," but there are some very important differences.





The Convair-Liner 340 has:

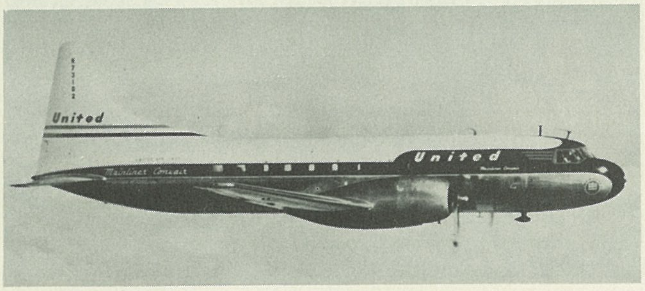
- Greater wing span
- Longer fuselage (11 passenger windows on each side)
- R2800-CB16 series engines
- Increased capacity fuel tanks
- Engine-driven compressor for pressurization
- Cargo areas both forward and aft
- CBM (chloro-bromomethane) fire ext. agent
- Larger landing gear wheels + low-pressure tires
- Four-section wing flap

Panel layout positions closely resemble those on the CV240; thus, if a pilot were suddenly transplanted from the cockpit of the 240 into the 340, the differences would hardly be noticeable.

The Convair-Liner 340 has retained all of the excellent flight and handling characteristics of the Convair 240.

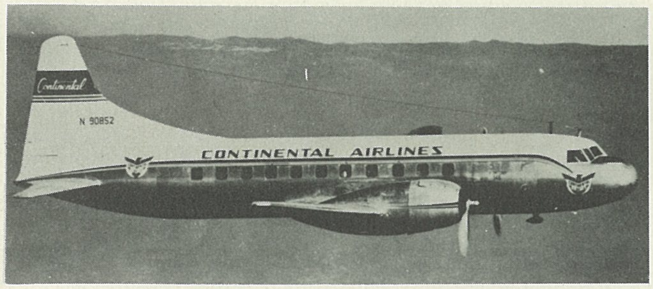
UAL United Air Lines
Main Base: San Francisco, California
Operating Routes: Continental U. S.

UAL received delivery of the first Convair-Liner 340 on the scheduled date of January 18, 1952. This airline is the largest operator of Convair-Liner 340's.



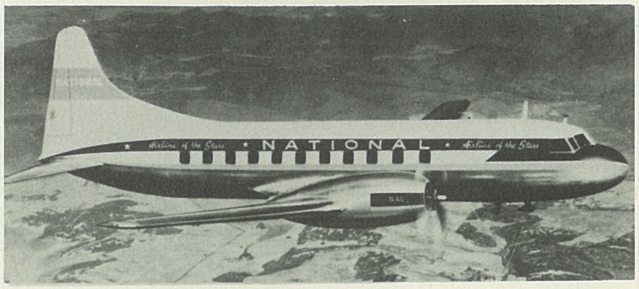
BNF Braniff International Airways
Main Base: Dallas, Texas
Operating Routes: Central U. S.

In August of 1952, MCA and Braniff merged under the Braniff banner. The Convair 240's owned by MCA were sold to Linee Aeree Italiane.



CAL Continental Air Lines
Main Base: Denver, Colorado
Operating Routes: Central U. S.

CAL operated Convair 240's for five years. With delivery of Convair 340's, their 240 aircraft were sold to CPA.

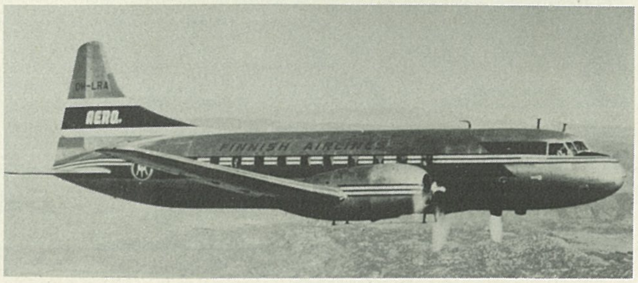


NAL National Airlines
Main Base: Miami, Florida
Operating Routes: Eastern U.S.

Delivery of Convair-Liner 340 transport from San Diego to Miami broke transcontinental speed record for twin-engine aircraft, by flying the 2300 miles in 7 hours 8 minutes.

DELTA C&S Delta Chicago & Southern
Main Base: Atlanta, Georgia
Operating Routes: Caribbean Area—Central U.S.

This airline is the first to operate Convair 340's in the Caribbean area, replacing 4-engine equipment. TWA flies Convair 340's on an exchange agreement with Delta C&S.



AERO O/Y Finnish Air Lines
Main Base: Helsinki, Finland
Operating Routes: Northern Europe

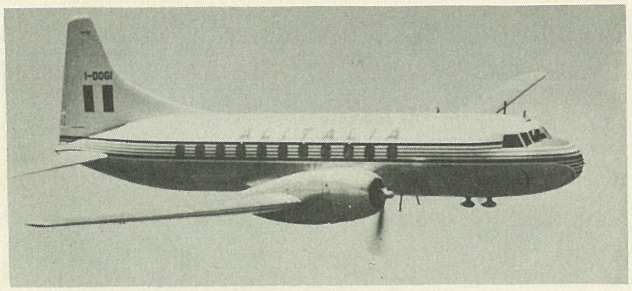
This operator's Convair 340's were the first to be delivered to a European country. The Convair's initial flight from Helsinki (1953) was a fitting tribute to this airline's 30th year of operation.

PAL Philippine Air Lines
Main Base: Manila, P. I.
Operating Routes: Philippine Islands and Regional Far East

The majority of PAL's inter-island and international flights are over water. Utilization runs as high as 11:40 hours on some flights.

ALITALIA Aerolinee Italiane Internazionale
Main Base: Rome, Italy
Operating Routes: Southern Europe, Sicily, and Libya

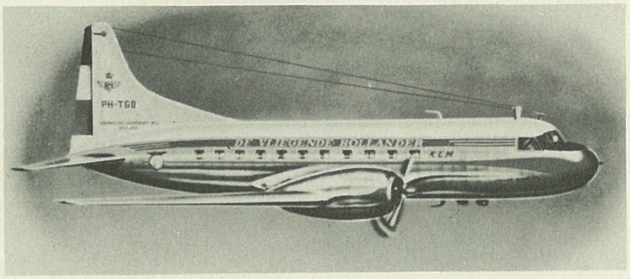
Alitalia flies two trips weekly from Rome to Malta, to Tripoli, a route formerly flown by 4-engine equipment. The airplane operates at a near 100% load factor on this route.



KLM Royal Dutch Airlines
Main Base: *Curacao Island
Operating Routes: *Central America, Caribbean, Mexico

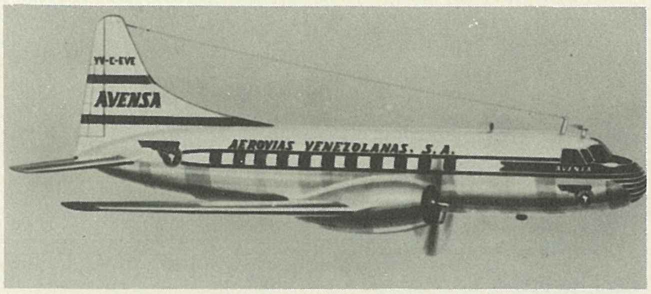
KLM's Convairs make daily flights to Miami and twice weekly flights to Mexico City with an average utilization of 9+ hours.

*Eight of KLM's 14 CV340's will be operated in Europe to supplement this operator's CV240 fleet.



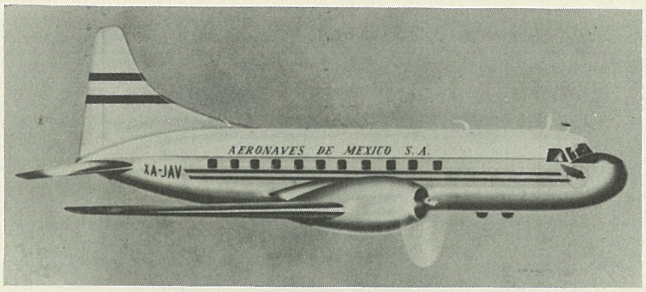
HAL Hawaiian Airlines
Main Base: Honolulu, Hawaii
Operating Routes: Hawaiian Islands

Convair 340's mark one more milestone in HAL's 24th year of progress. As a result of passenger preference for the 340, HAL expects its inter-island traffic to increase by 30%.



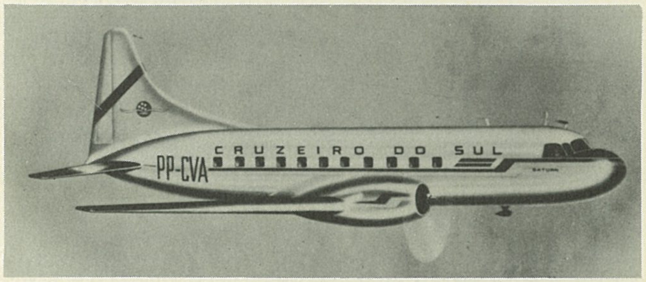
AVENSA Aerovias Venezolanas S. A.
Main Base: Caracas, Venezuela
Operating Routes: Venezuela & Caribbean Area

Avensa is an independent airline that competes with government-owned airlines in this area. It operates Convairs to Miami, Florida on the north, and to Trinidad island on the east.



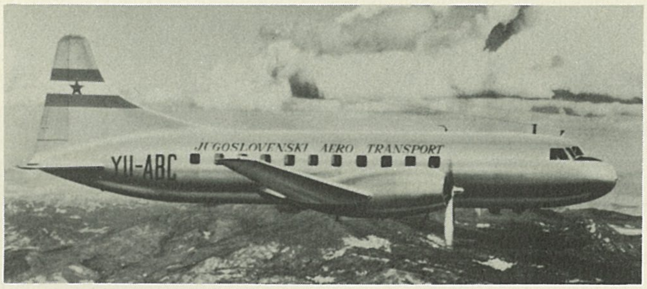
AERONAVES Aeronaves de Mexico S. A.
Main Base: Mexico City, Mexico
Operating Routes: Mexico

With the acquisition of two airlines in Mexico, Aeronaves has expanded its operations to include all of Mexico.



CRUZEIRO Servicos Aereos Cruzeiro do Sul
Main Base: Rio de Janeiro, Brazil
Operating Routes: Brazil, south to Buenos Aires, Argentina

Cruzeiro serves all of the important cities of Brazil. It is authorized to operate scheduled domestic, international, and charter service.



JAT Yugoslav Airlines
Main Base: Belgrade, Yugoslavia
Operating Routes: Central and Southern Europe to Istanbul, Turkey

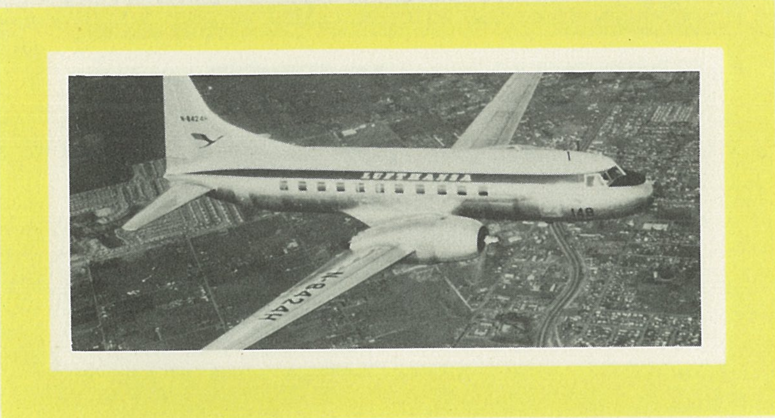
This operator utilizes its Convairs on newly established international routes, while maintaining other equipment for internal routes.

ROI Republic of Indonesia
Main Base: Djakarta, Indonesia
Operating Routes: Orient

The purchase of Convair 340's by the government supplements Garuda's fleet of Convair-Liner 240's. ROI airplanes fly under the banner of Garuda.

LUFTHANSA Aktiengesellschaft für
Luftverkehrsbedarf
Main Base: Hamburg, Germany
Operating Routes: Europe

This airline will resume operations after a lapse of 9 years with an all-new fleet of aircraft. Their CV340's will be the first of the new aircraft to be put into service.



ARAMCO Arabian American Oil Co.
Main Base: Dhahran, Saudi Arabia
Operating Routes: Middle East and Europe

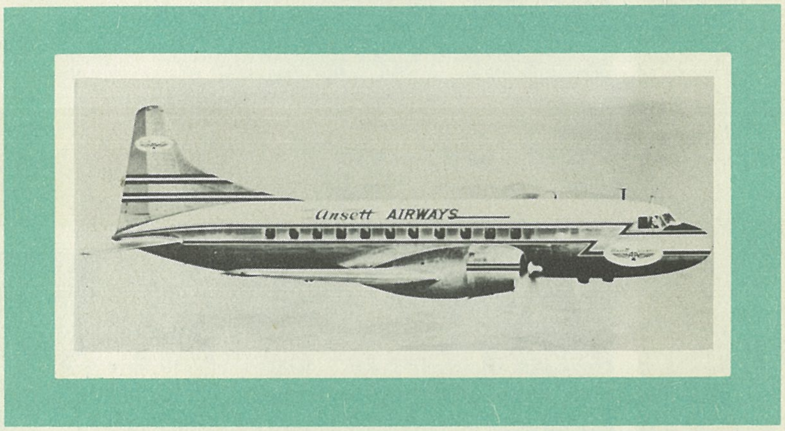
These aircraft are owned and operated by an oil company that finds it practical and economical to operate its own airplanes for business.

REAL Real S. A. Transportes Aereos
Main Base: Sao Paulo, Brazil
Operating Routes: South America

REAL, one of the three airlines operating Convairs in Brazil, is the youngest airline in Latin America. Since its inception after World War II, it has increased its routes each year.

LACSA Lineas Aereas Costarricenses, S. A.
Main Base: San Jose, Costa Rica
Operating Routes: Caribbean Area and Central America

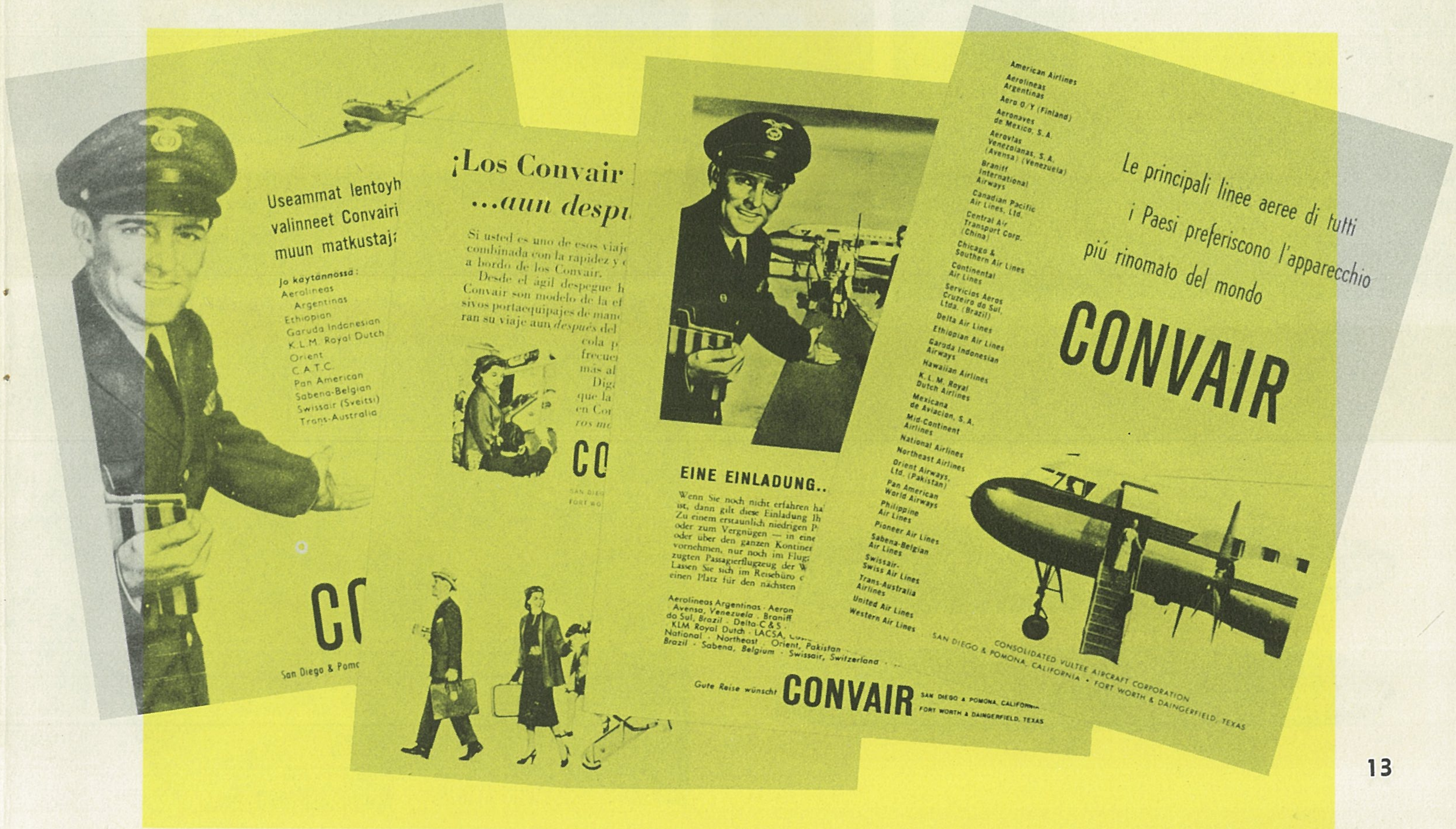
LACSA operates from Miami through to Panama City.



AA Ansett Airways
Main Base: Melbourne, Australia
Operating Routes: Australia

This operator services own aircraft and contracts to service aircraft for individuals and other companies. AA is the newest acquisition to the Convair 340 family.

IN ANY LANGUAGE, IT'S CONVAIR



Useammat lentoyh
valinneet Convairi
muun matkustaja

Jo käytännössä:
Aerolineas Argentinas
Ethiopian
Garuda Indonesian
K.L.M. Royal Dutch
Orient
C.A.T.C.
Pan American
Sabena-Belgian
Swissair (Sveitsi)
Trans-Australia

CO

San Diego & Pomo

¡Los Convair
...aun despu

Si usted es uno de esos viaj
combinada con la rapidez y
a bordo de los Convair.
Desde el ágil despegue h
Convair son modelo de la ef
sivos portaequipajes de man
ran su viaje aun *después* del
cola p
frecue
más al
Dig
que la
en Cor
ros mo

CO

EINE EINLADUNG..

Wenn Sie noch nicht erfahren ha
ist, dann gilt diese Einladung Ih
Zu einem erstaunlich niedrigen P
oder zum Vergnügen — in eine
oder über den ganzen Kontinen
vornehmen, nur noch im Flug
zugten Passagierflugzeug der W
Lassen Sie sich im Reisebüro
einen Platz für den nächsten

Aerolineas Argentinas · Aeron
Avensa, Venezuela · Braniff
do Sul, Brazil · Delta-C & S
KLM Royal Dutch · LACSA,
National · Northeast · Orient, Pakistan
Brazil · Sabena, Belgium · Swissair, Switzerland

Gute Reise wünscht **CONVAIR** SAN DIEGO & POMONA, CALIFORNIA
FORT WORTH & DAINGERFIELD, TEXAS

American Airlines
Aerolineas Argentinas
Aero O/Y (Finland)
Aeronaves de Mexico, S. A.
Aerovias Venezolanas, S. A. (Avensa) (Venezuela)
Braniff International Airways
Canadian Pacific Air Lines, Ltd.
Central Air Transport Corp. (China)
Chicago & Southern Air Lines
Continental Air Lines
Servicios Aeros Cruzeiro do Sul, Ltda. (Brazil)
Delta Air Lines
Ethiopian Air Lines
Garuda Indonesian Airways
Hawaiian Airlines
K. L. M. Royal Dutch Airlines
Mexicana de Aviacion, S. A.
Mid-Continent Airlines
National Airlines
Northeast Airlines
Orient Airways, Ltd. (Pakistan)
Pan American World Airways
Philippine Air Lines
Pioneer Air Lines
Sabena-Belgian Air Lines
Swissair-Swiss Air Lines
Trans-Australia Airlines
United Air Lines
Western Air Lines

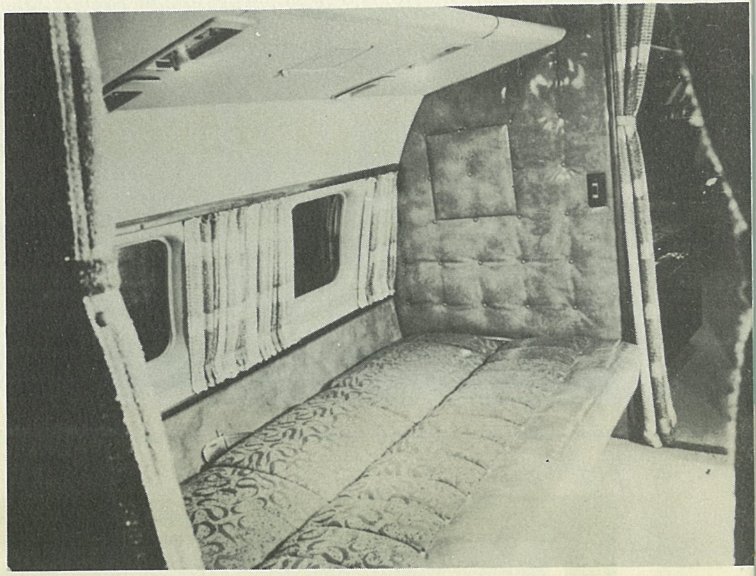
Le principali linee aeree di tutti
i Paesi preferiscono l'apparecchio
piú rinomato del mondo

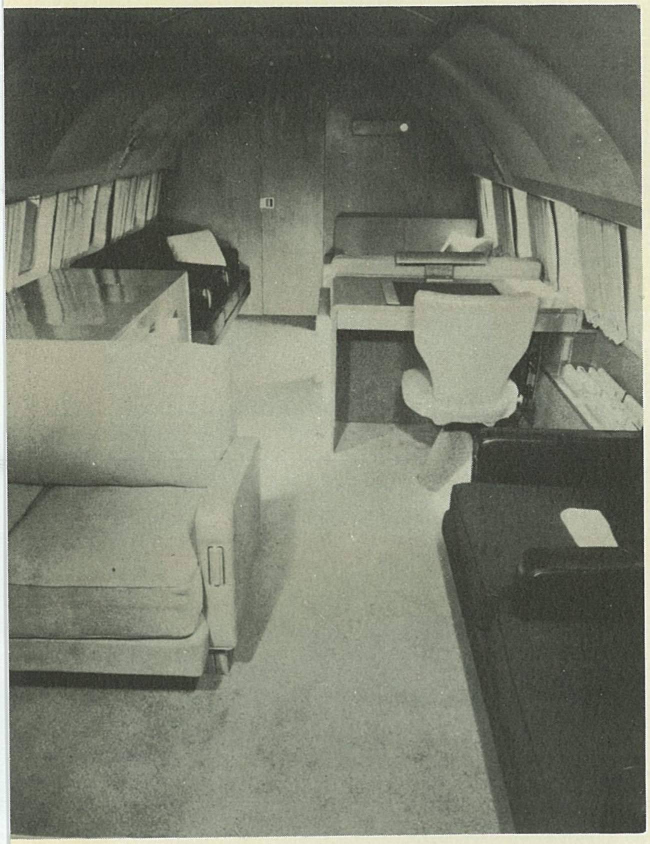
CONVAIR

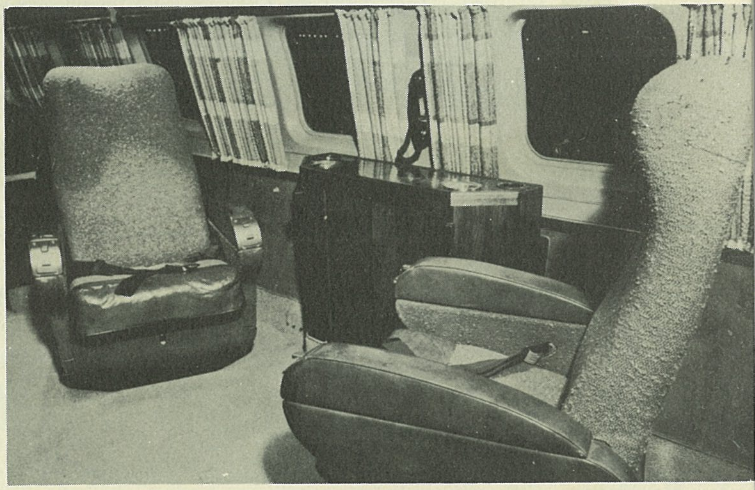
CONSOLIDATED VULTEE AIRCRAFT CORPORATION
SAN DIEGO & POMONA, CALIFORNIA · FORT WORTH & DAINGERFIELD, TEXAS

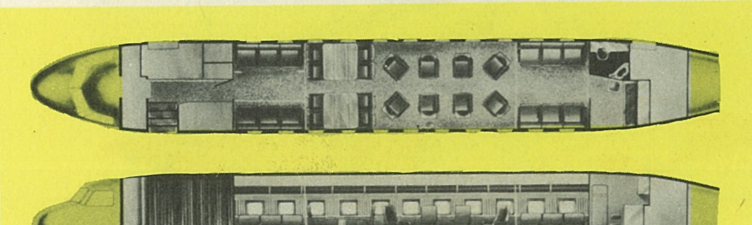
The EXECUTIVE

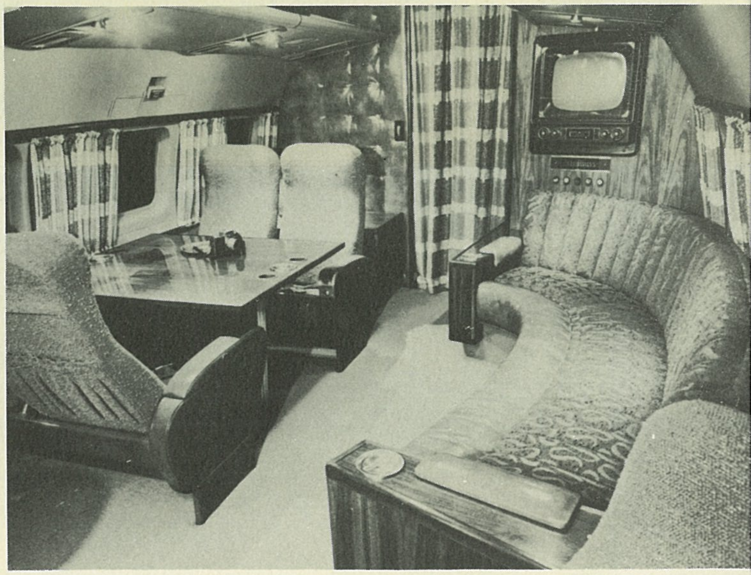
The Convair-Liner is designed not only for the requirements of scheduled operators, but of governments, corporations, and individuals. Pictured are views of interiors of some of the executive Convair 240's and 340's.





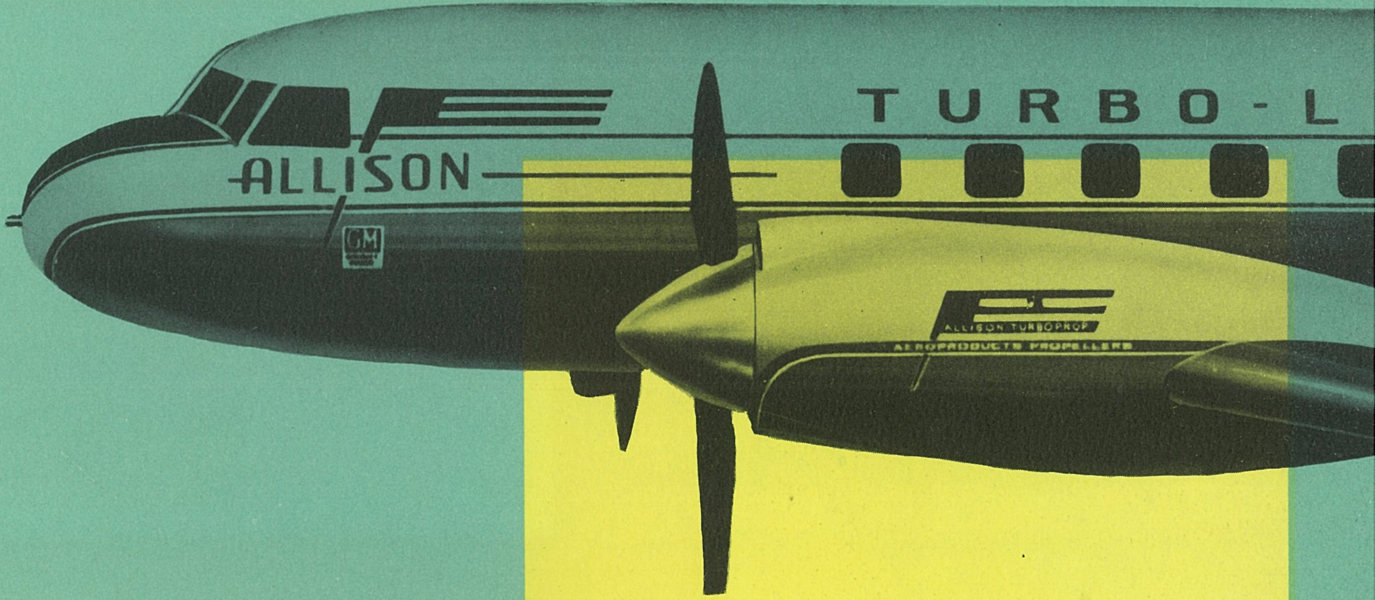






The TURBO-LINER

Propeller turbine power is the next logical step in the development of commercial transports. A Convair-Liner with such power plants has been gathering data and experience since December 1950 when the Convair Turboliner made its first flight.

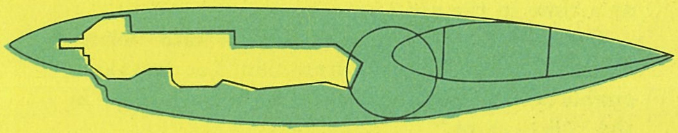


The Turboliner is being tested by the Allison Division of General Motors to prove the practical operation of turboprop power in aircraft.

240

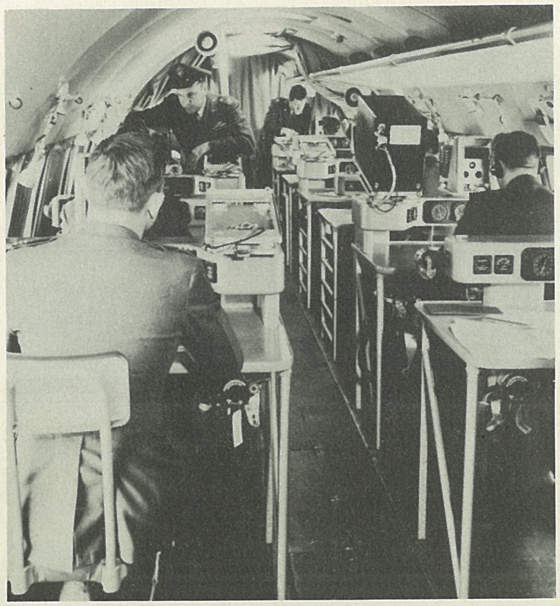
340

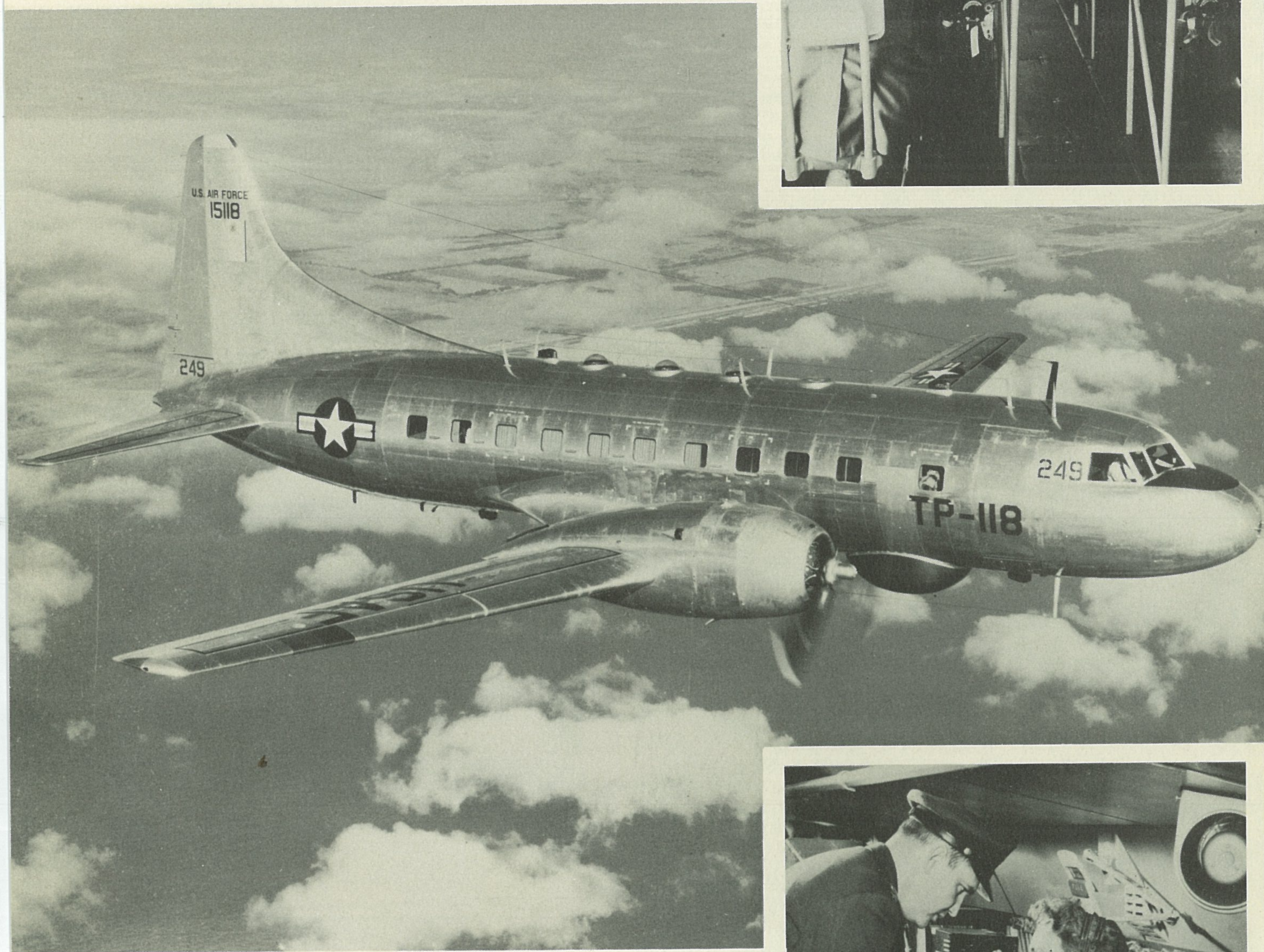
Convair-Liner 340's with turboprops have been ordered by the Air Forces for test purposes. Two configurations are being built. Shown at the right is the optimum nacelle for production CV340's with turboprops.



The T·29 FLYING CLASSROOM

A large number of T-29 "Flying Classrooms" is being used by the Air Forces for the training of bombardiers and navigators. T-29's are a military adaptation of the Convair-Liner 240 commercial transport.





Up to 14 trainees and their instructors can be accommodated on a single mission. Previously, these specialists could be trained only one or two at a time in the air.

Curtains divide the main cabin into "classrooms" for specialized instruction. Loudspeakers enable an instructor to talk to all students in the "classrooms."

Convair-Liner Operators' Conference

Convair was host to the ATA Conference which met at San Diego on March 2nd and 3rd to exchange ideas and knowledge of engineering and maintenance of Convair-Liner aircraft. Cliff Younie, Braniff International Airways, presided. Attending were representatives of 29 of the 46 operators of Convair-Liner type aircraft, as well as vendors. Those attending were:

AIRLINES

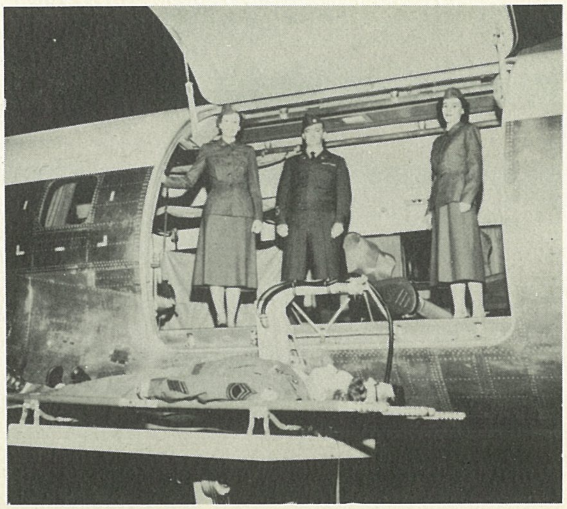
NAME	CUSTOMER
Aguilar, R.	PAL
Alt, H. W.	Luftag
Amorim, Dr. L.	Cruzeiro
Anderson, O. E.	UAL
Barber, J. A.	NAL
Barnett, L. B.	UAL
Brake, E.	PAA
Brenning, L.	UAL
Brock, G.	CAL
Cano, R.	Aeronaves
Carrillo, J.	PAL
Claisse, R.	Aerolineas
Clark, W. T.	Braniff
DeJong, H.	KLM
DeLuise, S. W.	Texaco
Dietzold, Paulo	Varig
Evans, Guy	Aero O/Y-Sabena
Fennema, C. L.	UAL
Fowler, G. R.	HAL
Fruehauf, Paul	UAL
Garfield, E. D.	Braniff
Geary, R.	Air Force
Gilles, J.	CPA
Holzapfel, H. W.	WAL
Horton, J. R.	Braniff
Lam, Gerry	KLM
Lawrence, B. W.	PAA
Luce, H. R.	Texaco
Lydon, Wayne	CAL
MacKinnon, D. W. H.	NEA
MacGregor, R. V.	Delta-C&S
Mies, W. W.	NEA
Miller, C. H.	UAL
Monroe, Ashley	USN
Morrison, A. J.	Union Carbide
Mull, Clarence	KLM
Nelson, G. R.	UAL
Olson, B. D.	AA
Pabst, B. H.	PAA
Pajor, Walt	P&W
Paoletti, Lorenzo	LAI
Richert, T. J.	UAL
Schlegel, L.	Luftag
Semple, H. C.	CPA
Snow, L. L.	P&W
Spearman, W. E.	AA
Splaine, E. J.	NEA
Stoval, D.	UAL
Stutts, A.	Air Force
Susalleck, P., Jr.	Cruzeiro
Sutrisno, Ahmad	ROI
Todorovic, B. J.	JAT
Torres, G.	Avensa
Townsend, F.	CPA
Turner, R. L.	AA
van Onselen, N.	Garuda
Vargas, K.	Aeronaves
Vosepka, F.	WAL
Younie, G. C.	Braniff

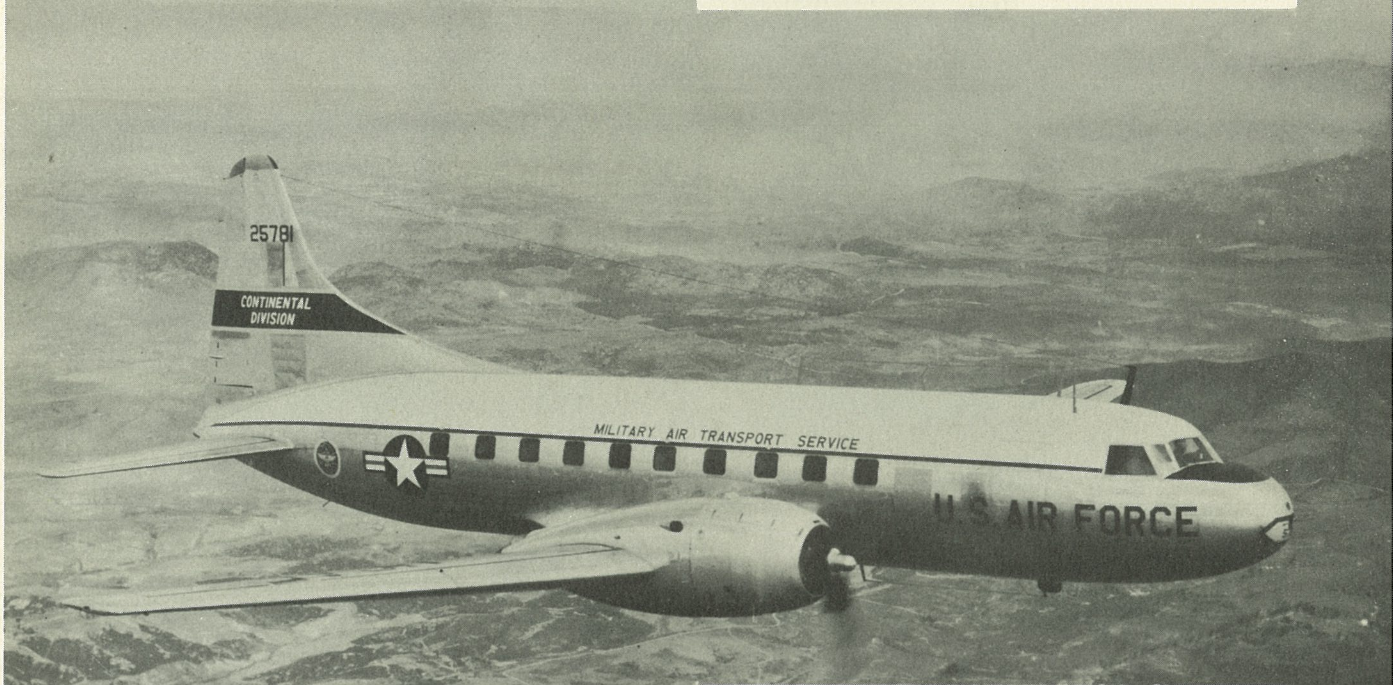
VENDORS

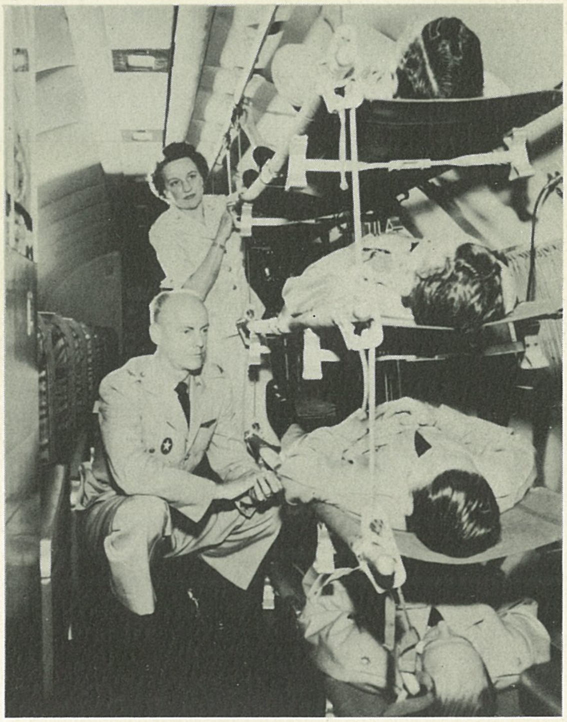
NAME	VENDOR
Abram, O. M.	Weatherhead
Adams, L.	Goodyear
Appleton, F. H.	Spencer
Barbera, R. T.	Airsupply
Barnett, H. W.	Airite
Beer, S.	Bendix
Bell, Walter	Bendix
Bobrick, A. L.	Bobrick
Brady, M.	Lear
Canney, F. R.	Pesco
Cole, R.	Hydro Aire
Connell, J.	AiResearch
Cowen, A. L.	Bobrick Mfg.
Edson, W.	NYAB
Ellingson, E. M.	AiResearch
Flatley, Tom	AiResearch
Flinn, W.	Vickers
Foushee, C. L.	Ryan
Gnadt, W.	NYAB
Greer, R. T.	Sperry
Gremley, E.	Vickers
Guzeko, E.	Bendix
Haberland, F.	Pesco
Hale, A. E.	P&W
Hill, D.	MPLS Honeywell
Hosterman, F. O.	Weston
Hyatt, Walter	Adel
Johnson, Roy	Hydro Aire
Krissman, J.	Pachmayr
Langenfeld, F. H.	Monsanto
Lentz, G. E.	Pachmayr
Lesnewski, F.	HSP
Lind, John	Bendix
Loughan, Tom	Whittaker
Maltby, T.	Bendix
Marshall, G.	Lear
Maxfield, W.	PAC
Mazner, J. R.	Bendix
McIver, Henry D.	Airsupply
Melkerson, N. O.	Pesco
Miller, Fred	Adel
Mitchel, Frazier	Aviation Serv
Mullins, Irving N.	Bendix
Myatt, J.	Whittaker
Peterjohn, R.	Weatherhead
Peterson, C. G.	Airsupply
Schaffner, J.	Airite
Schmidt, R.	Menasco
Smith, W. M.	NYAB
Sumner, S. W.	Jack & Heintz
Terry, Phillip D.	Whittaker
Tinker, H. E. W.	Airsupply
Van Camp, W. H.	Weston
Vescelus, G.	Menasco
Webel, L.	Sperry

The C-131 FLYING SAMARITAN

The "Flying Samaritan," is based on the design of the Convair-Liner 240. A fleet of these modern flying hospitals has been ordered by the Air Forces to provide high-speed air evacuation of sick and wounded personnel.



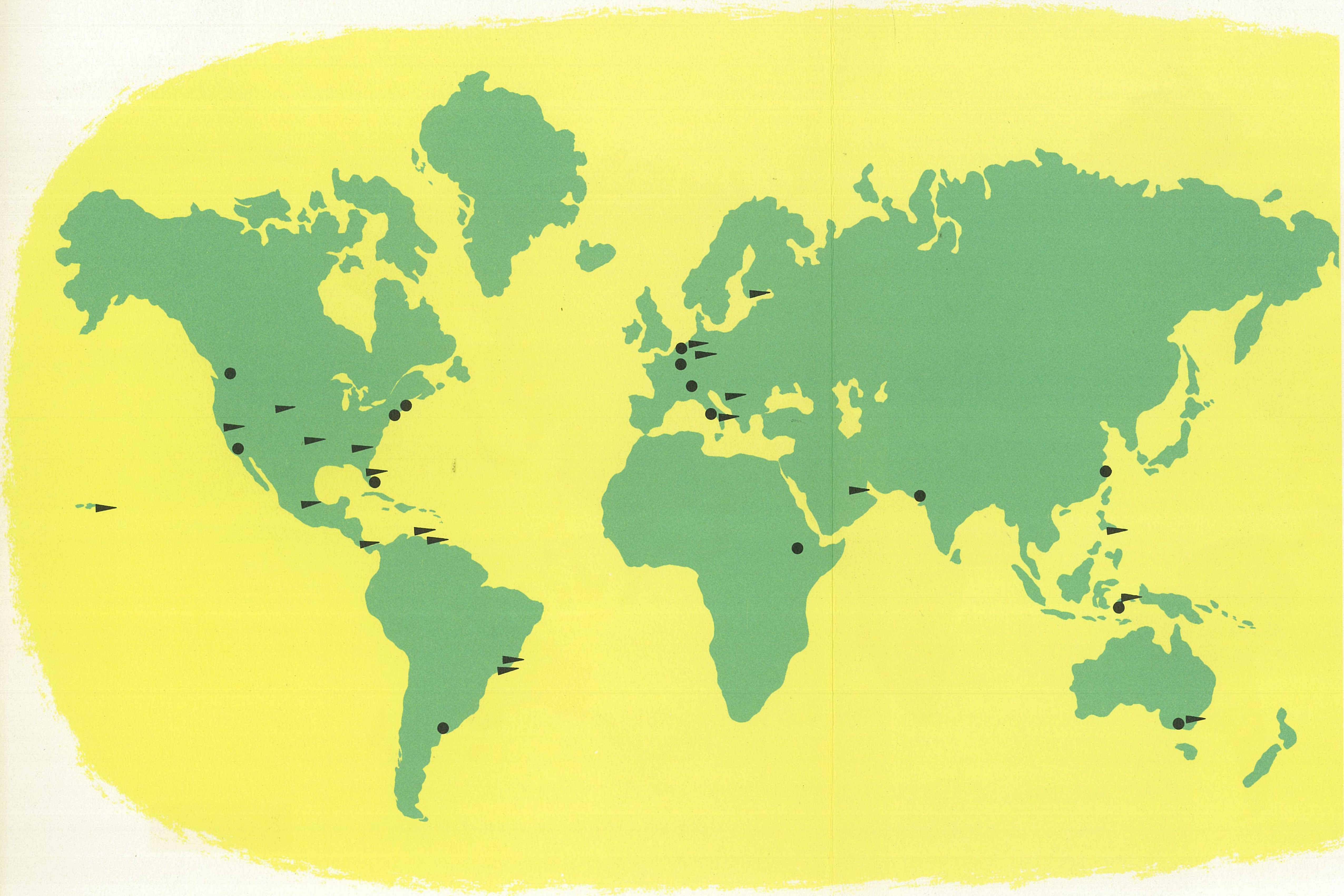




A total of 27 litters, four seated patients, and four attendants, or an alternate arrangement of 40 rearward facing passenger seats can be installed in the cabin. This alternate arrangement of seats and litters, or a combination of both, enable the Air Force to utilize its fleet of C-131A's for several types of operations. Easy loading and unloading of litters is possible with a large hydraulically-operated lift on the left side of the fuselage aft of the wing.

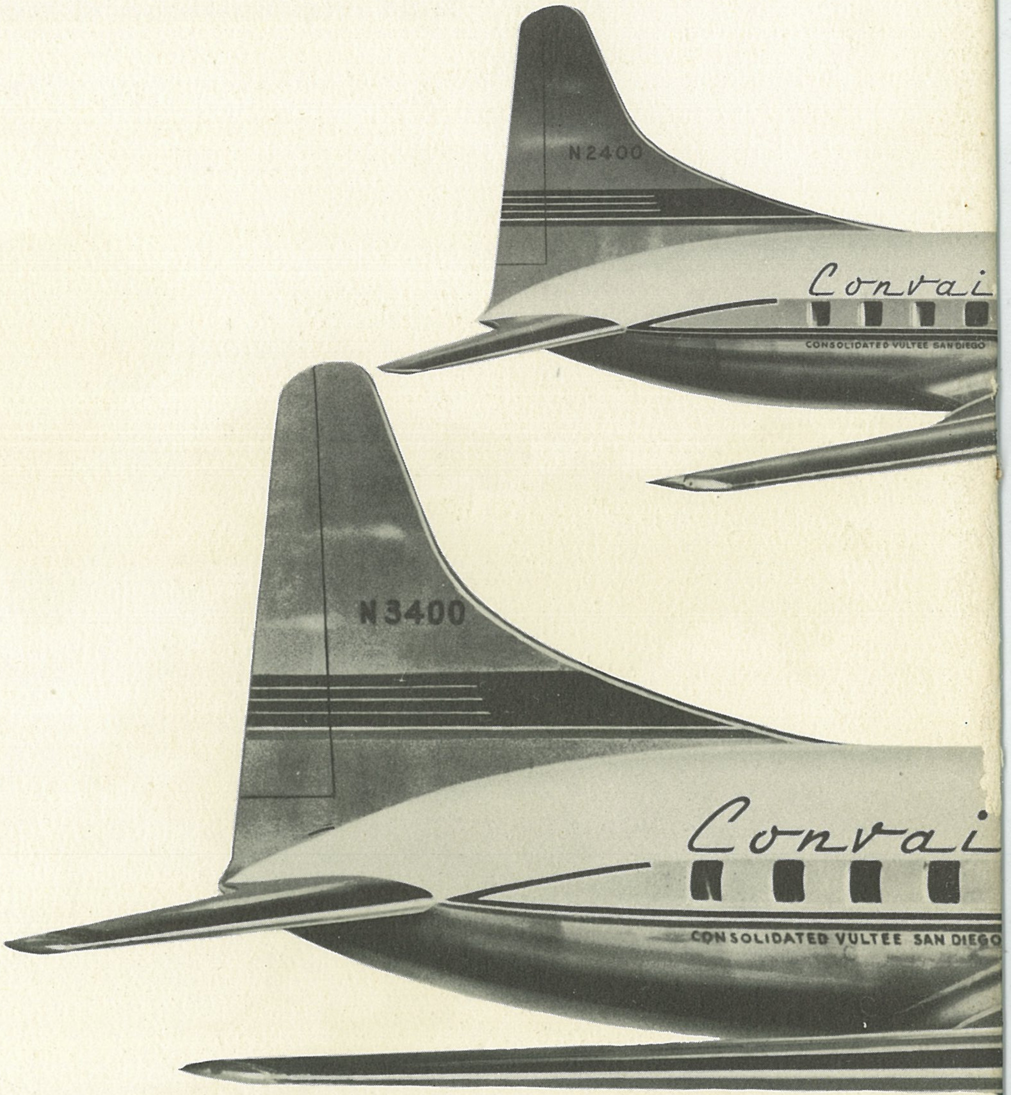
CONVAIR-LINER 240 · 340 OPERATORS

Not more than 4 hours flying time to any Convair-Liner major operational base



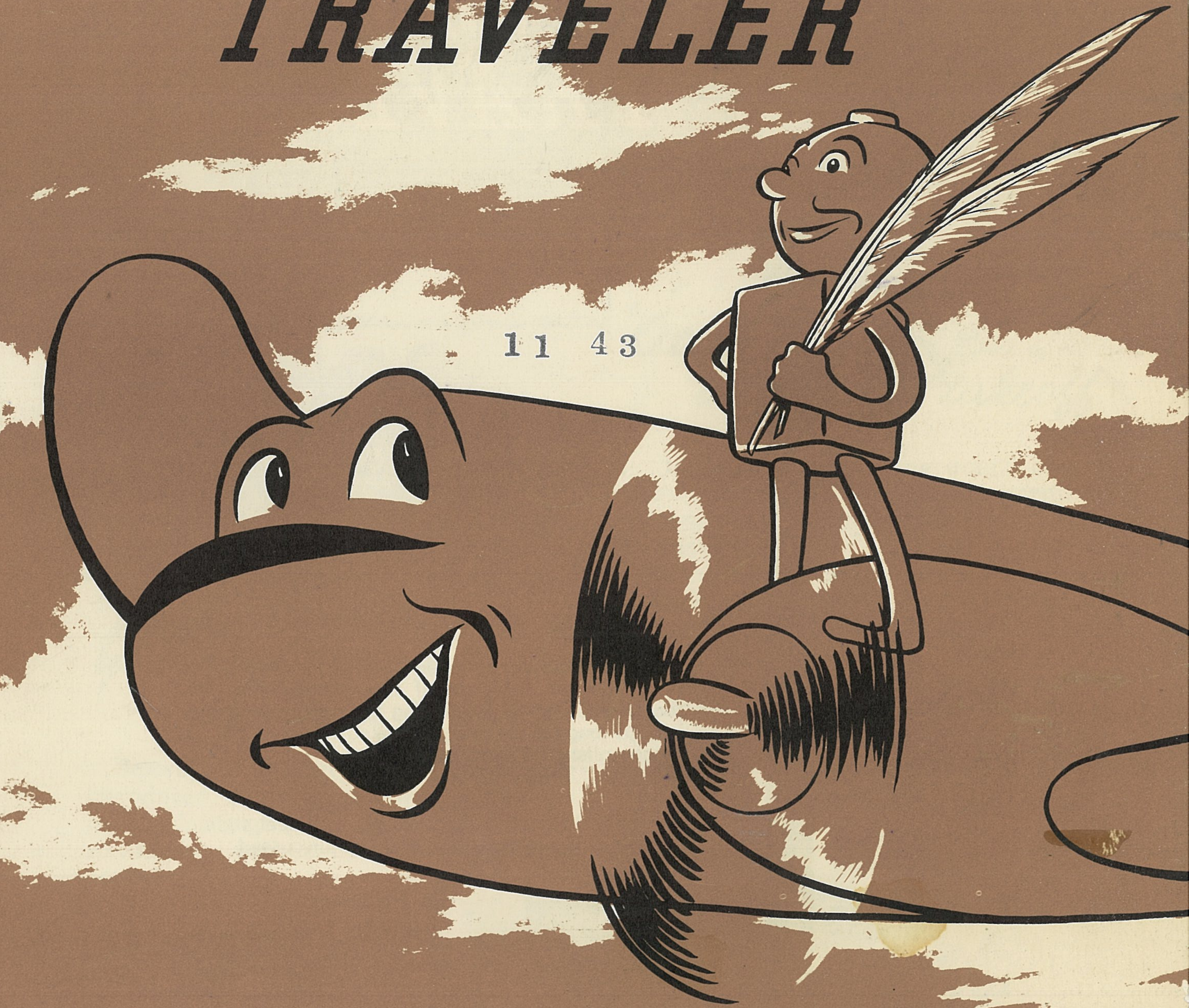
AA	*La Guardia Field, N.Y.*
NEA	*E. Boston, Mass.*
PAA	*Miami, Florida*
WAL	*Los Angeles, Calif.*
CPA	*Vancouver, B.C., Canada*
AA	*Buenos Aires, Argentina*
CATC	*Shanghai, China*
EAL	*Addis Ababa, Ethiopia*
GARUDA	*Djakarta, Indonesia*
KLM	*Amsterdam, Holland*
LAI	*Rome, Italy*
ORIENT	*Karachi, Pakistan*
SABENA	*Brussels, Belgium*
SWISSAIR	*Zurich, Switzerland*
TAA	*Melbourne, Australia*
BRANIFF	*Dallas, Texas*
CAL	*Denver, Colorado*
DELTA C&S	*Atlanta, Georgia*
NAL	*Miami, Florida*
UAL	*San Francisco, California*
AERONAVES	*Mexico City, Mexico*
AVENSA	*Caracas, Venezuela*
CRUZEIRO	*Rio de Janeiro, Brazil*
LACSA	*San Jose, Costa Rica*
REAL	*Sao Paulo, Brazil*
AII	*Rome, Italy*
AERO O/Y	*Helsinki, Finland*
ARAMCO	*Dhahran, Saudi Arabia*
HAL	*Honolulu, Hawaii*
JAT	*Belgrade, Yugoslavia*
LUFTHANSA	*Hamburg, Germany*
PAL	*Manila, P.I.*
ROI	*Djakarta, Indonesia*
AA	*Melbourne, Australia*

● *Convair-Liner 240's*
► *Convair-Liner 340's*



CONSOLIDATED VULTEE AIRCRAFT CORPORATION / *San Diego, California*

Convair
TRAVELER



11 43

JUNE 1954
VOLUME VI
NUMBER 2

Convair TRAVELER

JUNE 1954
VOLUME VI
NUMBER 2

Chief Engineer
F. W. Fink

Chief of Service
J. J. Alkazin

Editor
G. S. Hunter

A digest of Convair-Liner operation and service published monthly by the Service Publications Section of Convair in the interest of Convair-Liner operators and for the promotion of sales and service. Communications should be addressed to Chief of Service, Convair, San Diego 12, Calif.

FOREWORD

The autofeathering system . . . A convair original . . . relieves the pilot of the responsibility for accomplishing a feathering operation in event of an engine failure on takeoff. How this is accomplished is described with the help of "Otto Feather," the actuator.

An anti-skid device for decreasing wheel sliding and for increasing tire life is also discussed.

ON THE COVER

"Otto Feather," created by artist Bob Kingett, is ready and waiting to accomplish an autofeather operation, whenever the need arises.

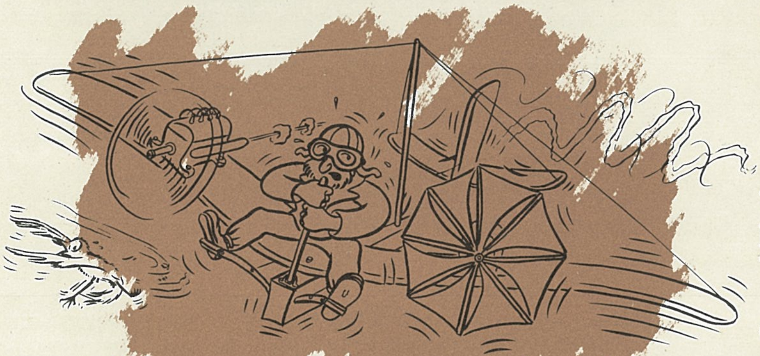
The information published in the Convair TRAVELER is to be considered accurate and authoritative as far as Convair approval is concerned. CAA approval, however, is not to be implied unless specifically noted. Airline personnel are therefore advised that use of this material may be restricted by their respective company policies or by CAA publications. Permission is hereby granted to republish any information here presented, but it is suggested that the material be verified with Convair to insure that it conforms with latest changes and developments.

Copyright 1954

CONSOLIDATED VULTEE AIRCRAFT CORPORATION • SAN DIEGO, CALIFORNIA

the Pilot & Autofeathering

Much has been said about propeller autofeathering. Sides have been taken, and strong opinions formed. This story, however, is a recital of facts—the why and how of the system. The attempt is made to clarify rather than edify.



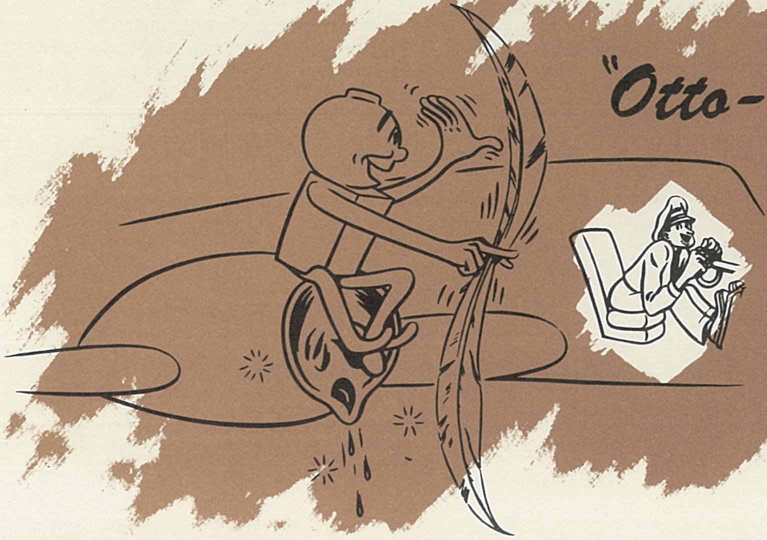
ye oldtimer had to windmill it home

Before full feathering propellers were introduced, many an oldtimer earned his paycheck bringing his airplane back home . . . nip and tuck . . . with a windmilling propeller.

"Otto-Feather" is armed for takeoff

"Get rid of windmilling drag," became the watchword. With this requirement, the pilot set up a definite criterion, and it came to pass.

As soon as propeller feathering became commonplace, other problems entered the picture. Airplanes became bigger and faster, engines more powerful, propellers fatter. More of everything then meant that, when an emergency occurred, certain controls had to be operated pronto. Therefore . . . *little time for cogitation, decisions, and action.*

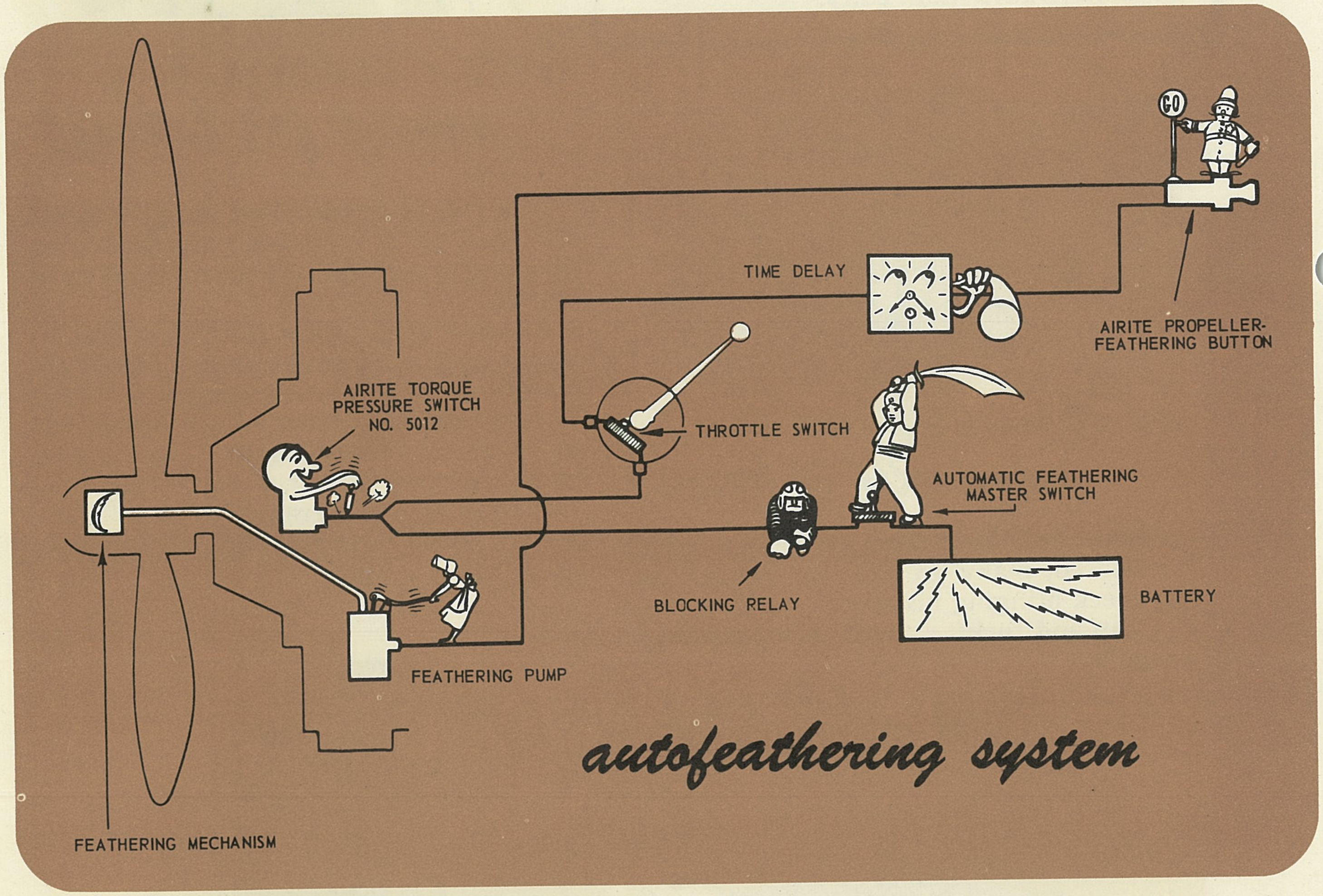


"Otto-Feather" relieves the pilot of responsibility for feathering a propeller

Airplane performance and crew activity are most critical during the takeoff regime. Takeoff distance and initial climb performance are a composite of horsepower, weight, drag, and flight management. Autofeathering would allow the operator to obtain the best payload performance. This could not be overlooked.

And so, automatic feathering was born.

The Convair-developed, CAA-approved autofeathering system satisfies the need and, as a result, provides today's modern transports with maximum performance, efficiency, and safety.

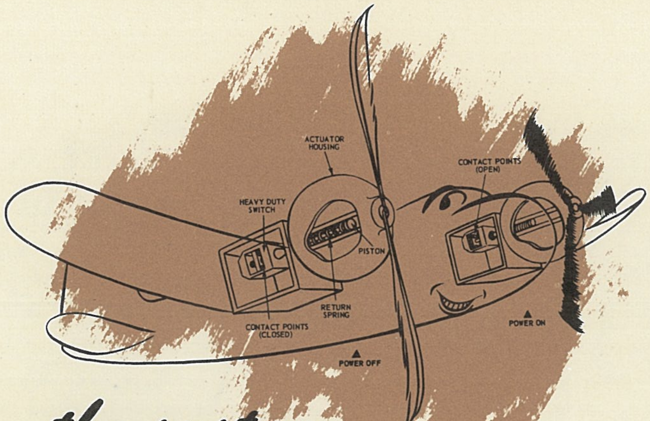

GO
TIME DELAY
AIRITE PROPELLER-FEATHERING BUTTON
AIRITE TORQUE PRESSURE SWITCH NO. 5012
THROTTLE SWITCH
AUTOMATIC FEATHERING MASTER SWITCH
BLOCKING RELAY
BATTERY
FEATHERING PUMP
autofeathering system
FEATHERING MECHANISM

How does it work?

It isn't complicated and it's not mysterious. The pilot has complete control of the system through one switch. It is ON for takeoff, and OFF for the rest of the flight. A green light (green for GO) near the switch assures the pilot that the system is ready to do its job, if it's needed.

With the throttles advanced beyond approximately the 3/4 open position, and with power being delivered to the propeller, the system stands on guard ready for action.

A time-delay feature of the system plays an important role. It delays the automatic initiation of feathering, until it is definite that a power loss is not due to a momentary backfire. If engine power drops to and remains below approximately 500 horsepower, feathering is initiated. Feathering takes place while positive thrust is still available and, consequently, it relieves the pilot of tremendous windmilling drag. Naturally, an autofeather operation will not take place if for any reason the pilot retards the throttle below the 3/4 open setting. Switches in the throttle quadrant see to



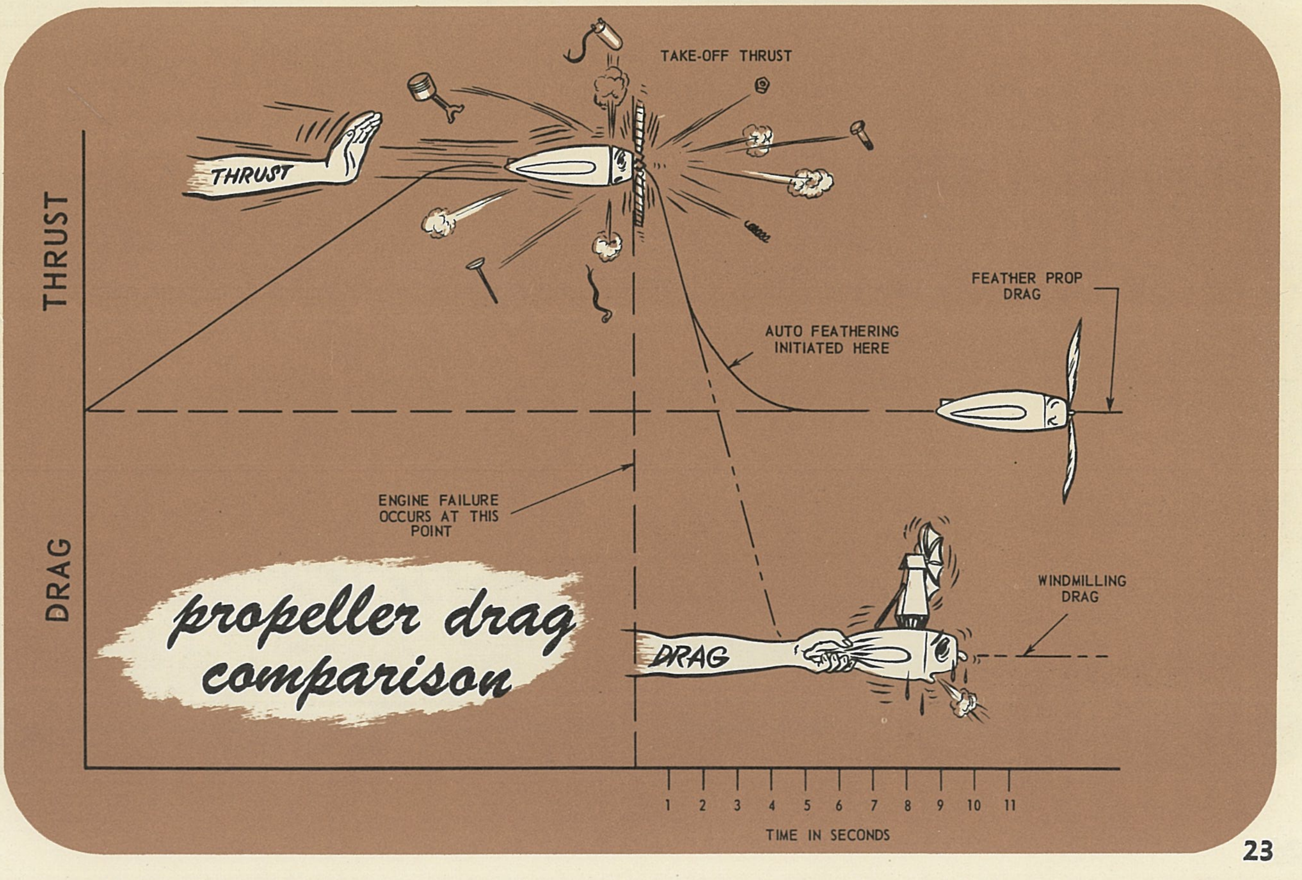
the system automatically feathers the propeller if engine failure occurs during takeoff

this. With all controls set for takeoff, the system will take care of feathering the correct propeller in event of power failure.

A blocking relay in the system prevents automatic feathering of a propeller if any other propeller has been feathered. Should a pilot want to manually feather a propeller at any time, he can still do so by the customary pushing of the appropriate button. If manual feathering is chosen, consideration must be given to:

1. The correct selection of propeller to be feathered.
2. The time left to unfeather if selection is not correct.

the aircraft is completely capable of establishing a safe rate of climb with its remaining power



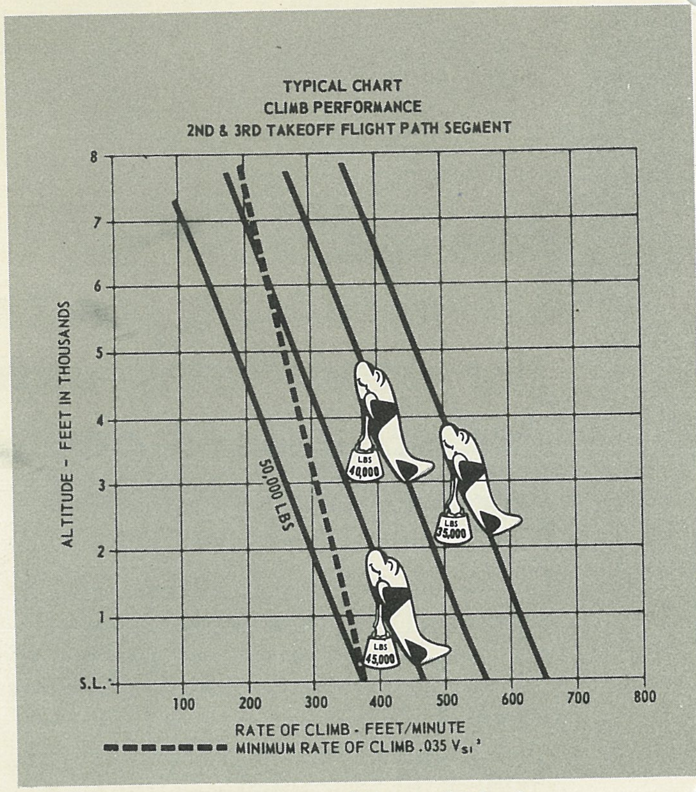
To sum up the facts:

The automatic feathering system merely actuates the manual feathering switch (button) for the pilot while he is busy carrying out other emergency operations.

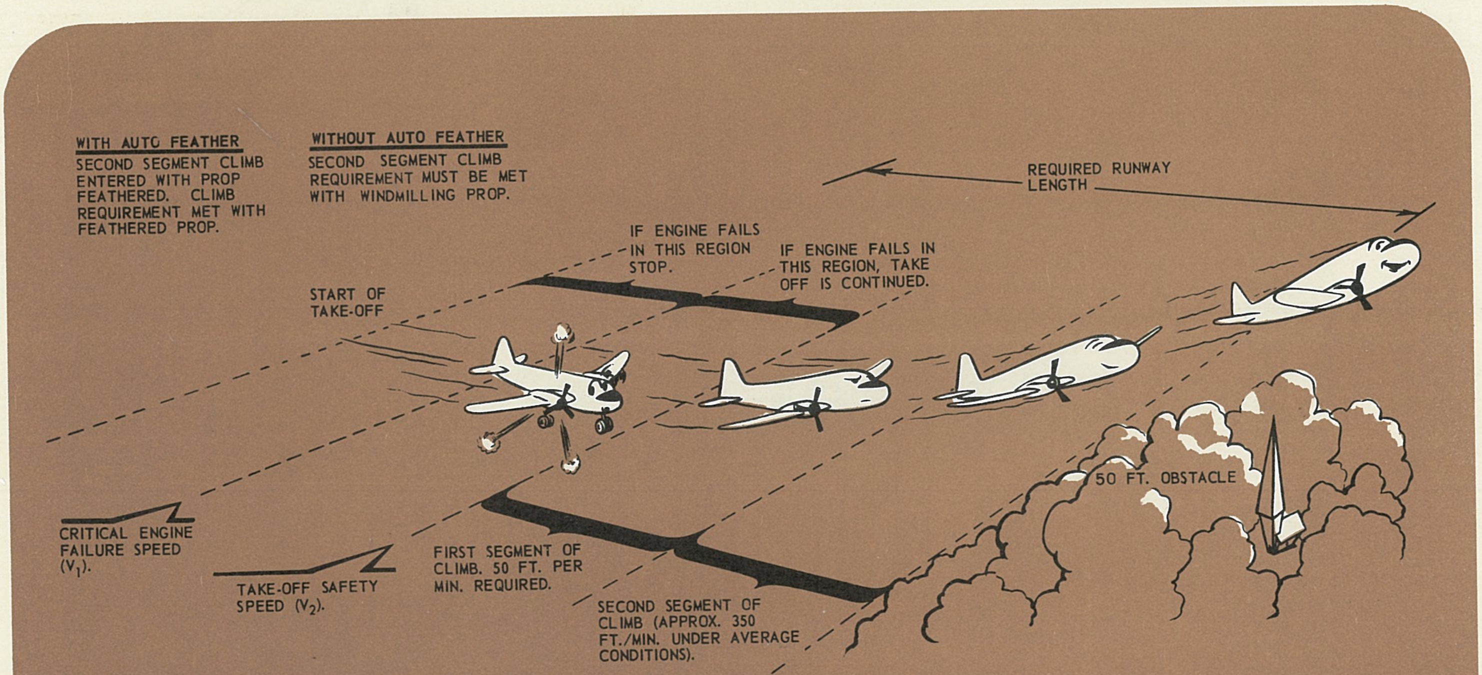
Convair-Liners alone are now past the two million takeoff mark with several additional millions added by other aircraft incorporating autofeathering.

With autofeathering, an airplane is completely capable of establishing a safe rate-of-climb with its remaining power. When a safe altitude is reached and the pressure of the emergency has subsided, more time is available to analyze the problem.

These are the facts.



CAR Required Rate-of-Climb
One Engine Inoperative
Propeller Feathered


WITH AUTO FEATHER
SECOND SEGMENT CLIMB ENTERED WITH PROP FEATHERED. CLIMB REQUIREMENT MET WITH FEATHERED PROP.
WITHOUT AUTO FEATHER
SECOND SEGMENT CLIMB REQUIREMENT MUST BE MET WITH WINDMILLING PROP.
REQUIRED RUNWAY LENGTH
IF ENGINE FAILS IN THIS REGION STOP.
IF ENGINE FAILS IN THIS REGION, TAKE OFF IS CONTINUED.
START OF TAKE-OFF
50 FT. OBSTACLE
CRITICAL ENGINE FAILURE SPEED (V_1).
TAKE-OFF SAFETY SPEED (V_2).
FIRST SEGMENT OF CLIMB. 50 FT. PER MIN. REQUIRED.
SECOND SEGMENT OF CLIMB (APPROX. 350 FT./MIN. UNDER AVERAGE CONDITIONS).

TAKEOFF AND CLIMB PATH
(CAA Regulation 04)

DECELOSTAT

Anti-Skid Device

Provisions for mounting an anti-skid device are engineered on all Convair-Liner 340's. Operators have their choice of either the Hytrol unit, manufactured by Hydro-Aire, or the DECELOSTAT, manufactured by Westinghouse Air Brake Company of Wilmerding, Pennsylvania. Since the DECELOSTAT is the only anti-skid device installed on Convair-Liners at this writing, and since other Model 340 operators have expressed an interest in this unit, only this installation will be described.

At such time that the Hytrol equipment is certified for, and installed on, Convair-Liners, the information will be considered for publication in the Traveler. Hydro-Aire has submitted complete engineering and installation data on the Hytrol unit, and these may be obtained from the manufacturer.

Brakes are designed on the basis of weight and stalling speeds. Anti-skid devices, which assist braking but are not necessarily required, are designed to eliminate skidding and/or wheel sliding after touchdown. Even with inadvertent application of brakes before touchdown, pressure on the braking system does not take effect until the wheels contact the runway; thus, there are no "locked wheel" landings. This smooth braking increases tire life by minimizing skid wear and blowouts. Cost of tire maintenance, which is considered in terms of time required to change tires, and loss of flight time because of unscheduled tire changes is considerably reduced.

The DECELOSTAT system relieves the pilot of the determination of the proper time for brake application. Since the Convair 340 was engineered in the nose-down attitude, main wheel loadings are appreciably constant, thereby giving the optimum in braking efficiency. The pilot, therefore, can apply a full, steady brake pressure until the airplane comes to a stop. In the event of failure of the DECELOSTAT installation, the system automatically reverts to normal braking operation. Shuttle valves on each wheel separate normal hydraulic braking from emergency braking. This allows pilot to apply emergency brakes whenever required.

Since Convair-Liner routes are being extended throughout the world, landings are often made on unimproved runways. An anti-skid device on these surfaces provides directional control during braking that is comparable to control on smooth surfaces. Braking efficiency is improved, too, on snow- and ice-covered runways, control being comparable to that on dry surfaces.

The DECELOSTAT equipment consists of a Controller mounted on the outboard side of each wheel, and a Valve, which works in conjunction with the Controller. The unit is mounted at the point where pressure enters the brake. It functions to relieve braking pressure when a predetermined rate of deceleration of the wheel is reached. This rate is that which results in wheel sliding, and may be adjusted by substitution of different weight rate springs. As brake pressure is relieved, deceleration rate lessens to a point where rolling friction is greater than braking effort, and braking pressure is automatically re-established to continue the slow-down of airplane momentum.

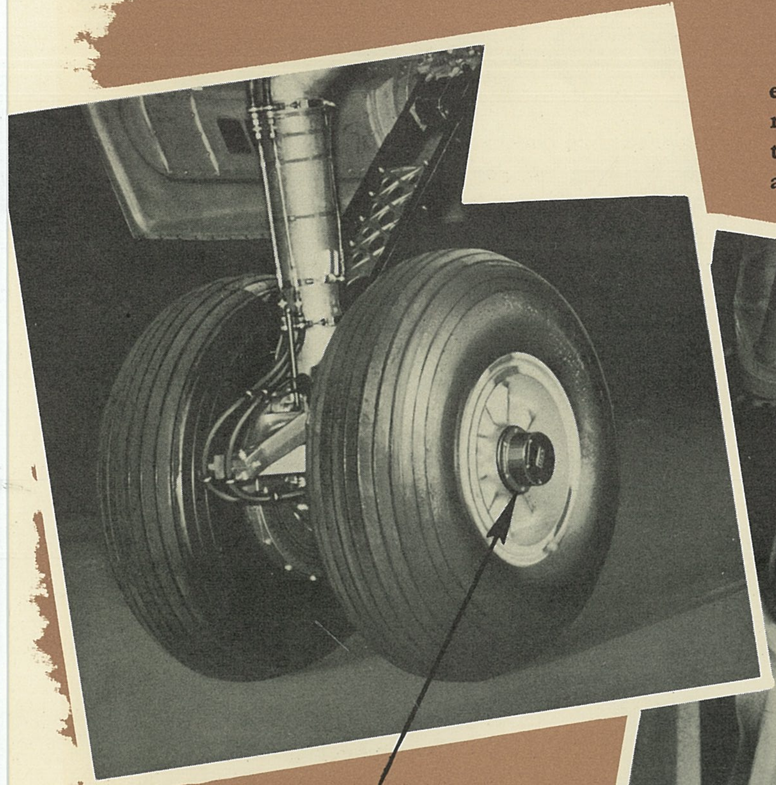
When the airplane wheel deceleration rate exceeds that above which a normal stop (a stop without sliding) can be made, the Controller functions instantly to initiate a brake release. As the airplane wheel accelerates back to its normal speed, the Controller again initiates a brake release to insure against full brake being applied until normal speed is obtained.

These two brake releases (deceleration and acceleration) occur in such rapid succession that they appear as one. As the airplane wheel acceleration rate decreases to zero, indicating normal speed, the Controller functions instantly to restore full brake.

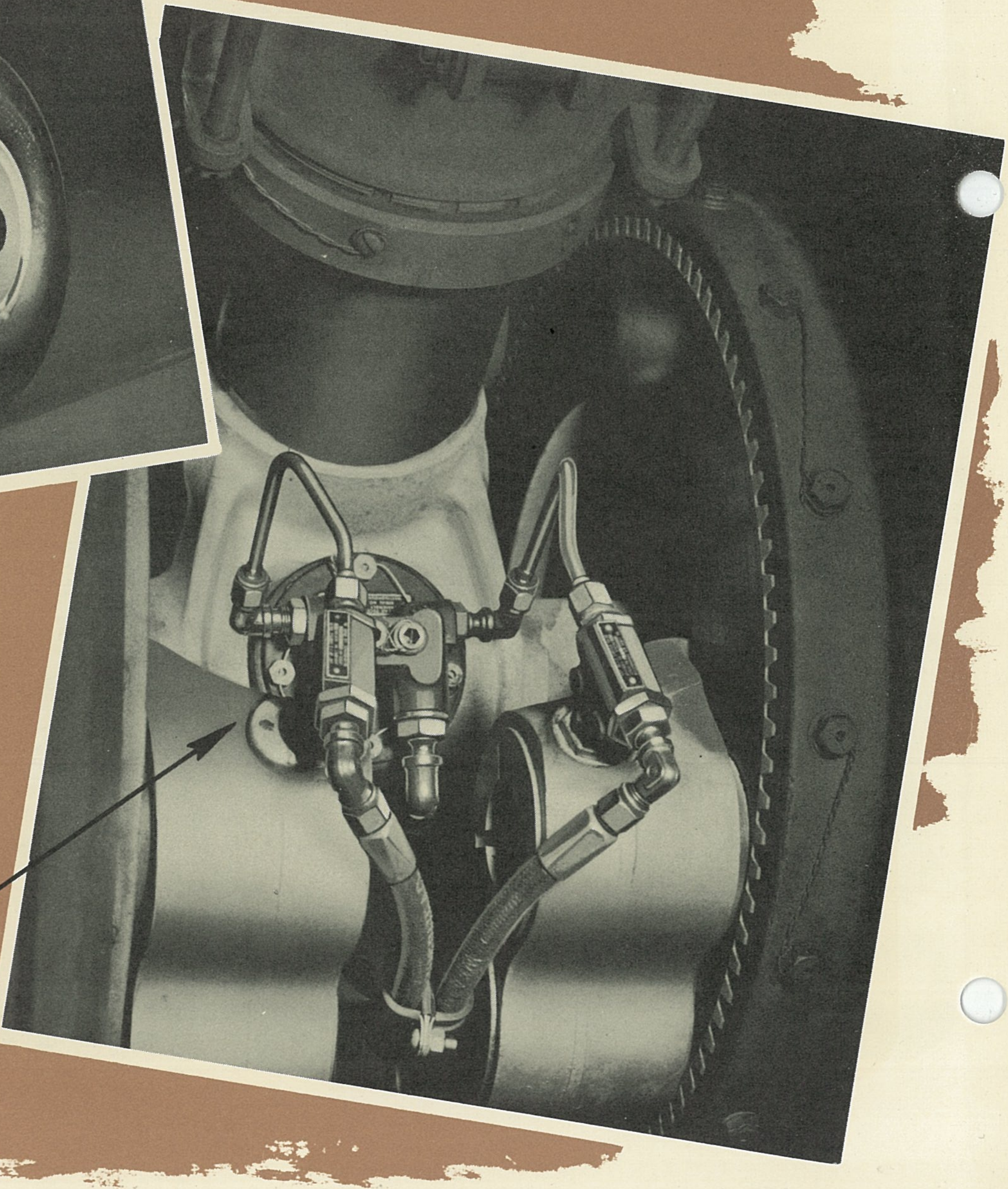
The degree of brake release is dependent on the time for the cycle, which in turn is dependent on the following conditions: ground coefficient, wheel loading, and brake pressure. Since the Controller indicates the action of the wheels individually, all conditions are automatically compensated for to maintain the maximum retarding force throughout the stop.

In order to minimize the time required to obtain full brake after the airplane wheel has attained normal speed, the clutch arrangement shown on page 28 is included.

Following is the principle of operation. A latch engages the clutch, which rides between the bearing ring and ring gear, the ring gear, in turn, rides on the washer which acts merely as a wearing plate and may be considered integral with the housing.

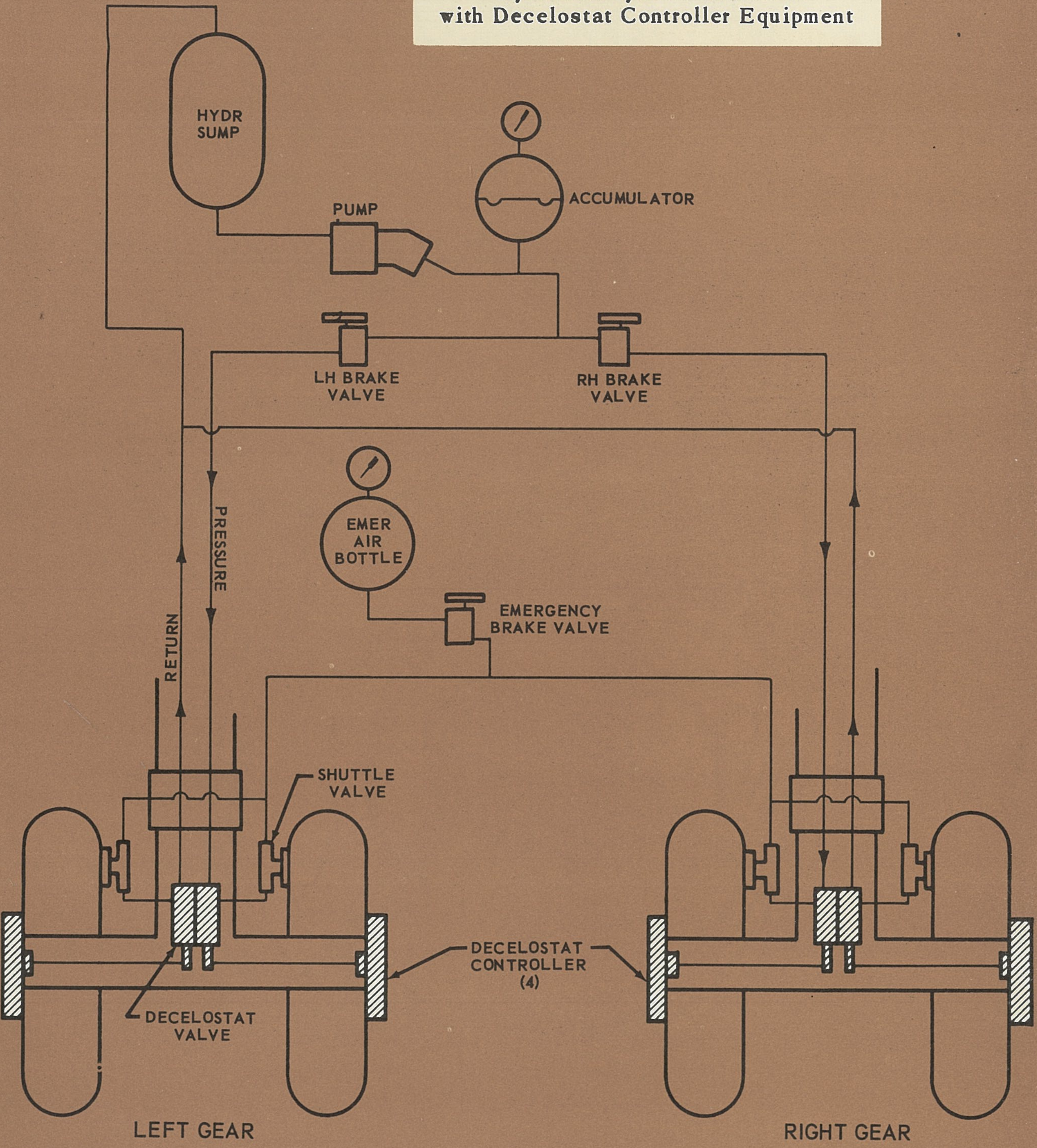


Decelostat Controller Installation

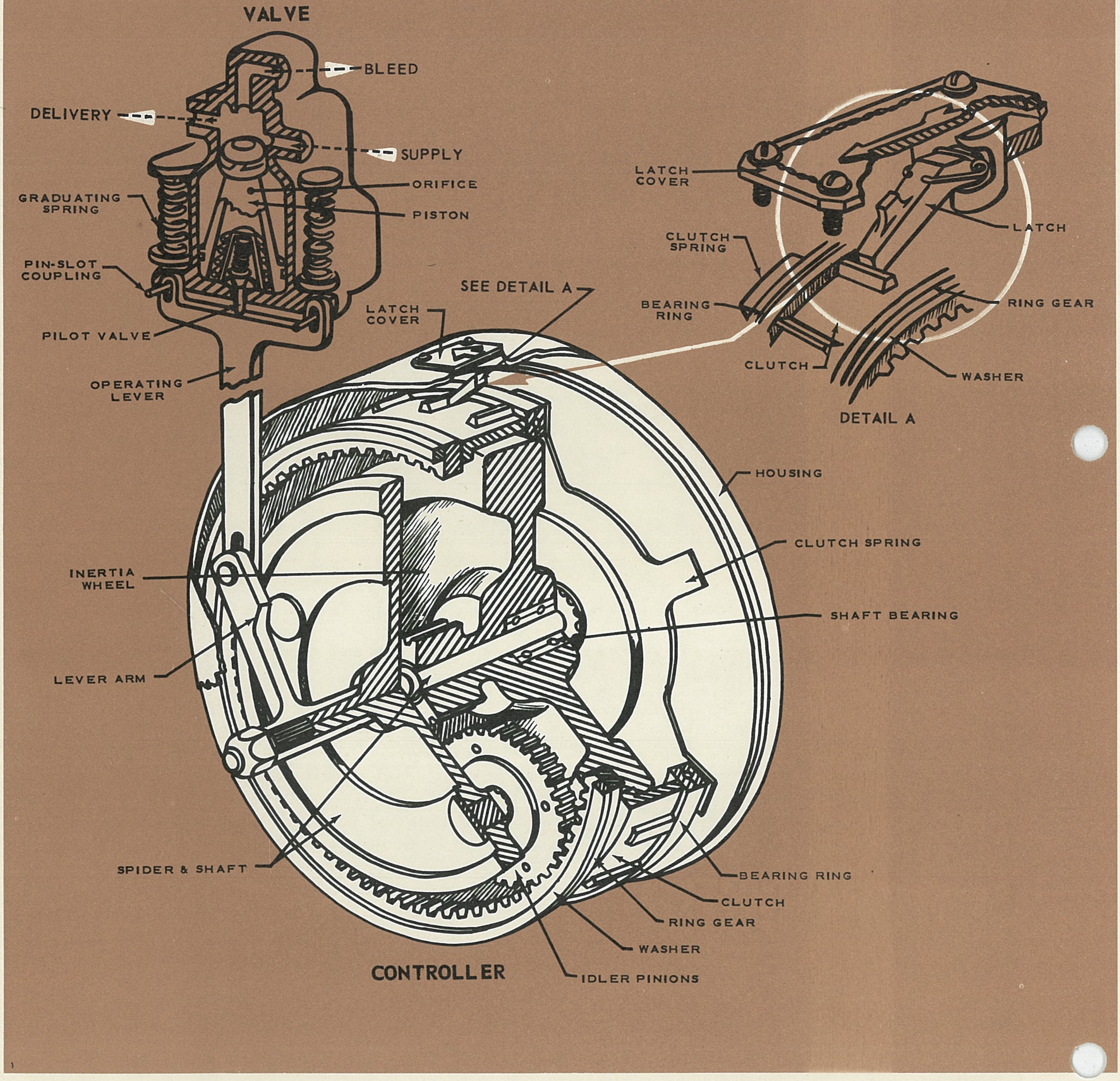


Decelostat Valve Installation

Hydraulic System Schematic with Decelostat Controller Equipment



Decelostat Assembly



The inertia wheel will be driven in the opposite direction from and at a speed seven times greater than the ring gear due to the gear ratio involved. As the airplane wheel begins to slide, the ring gear will be driven counterclockwise by the inertia wheel.

The clutch is free to rotate in this direction on the bearing ring and will be carried with the ring gear which will slide over only the washer; thus, the housing can drive the ring gear through only one friction element. Therefore, the energy extracted from the inertia wheel during a slip or slide is reduced to the minimum necessary to operate the Decelostat valve, plus a reasonable margin.

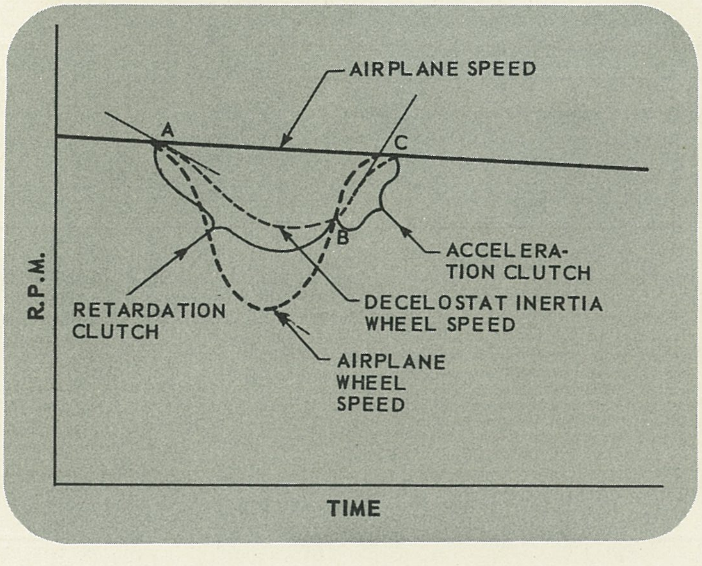
As the wheel picks up again, however, the ring gear, which attempts to remain stationary, due to its connection to the inertia wheel, will be picked up by friction of the clutch on one side, which is turned in this direction with the housing through the latch and washer on its opposite side, thus imposing two friction elements to aid in bringing it up to speed.

By this means, rate of acceleration of the inertia wheel will be twice that of deceleration. This will allow brake pressure to apply more closely to the time the wheel reaches the application speed.

A DECELOSTAT installation on a Convair-Liner 340 under cognizance of the CAA indicated that, in both rejected takeoff (high-speed) stops, and landing (low-speed—full-flap) stops, the stopping distance was appreciably reduced. The following table shows the results of six stops, three stops each with 15° wing flaps and 40° wing flaps.

		STOPPING DISTANCE	
WING FLAP CONFIGURATION	SPEED FT/SEC	WITHOUT DECELOSTAT	WITH DECELOSTAT
15°	185.5	1990	1502
15°	182.9	1915	1597
15°	183.5	1930	1650
40°	150.5	1540	1202
40°	151.5	1580	1130
40°	152.0	1595	1398

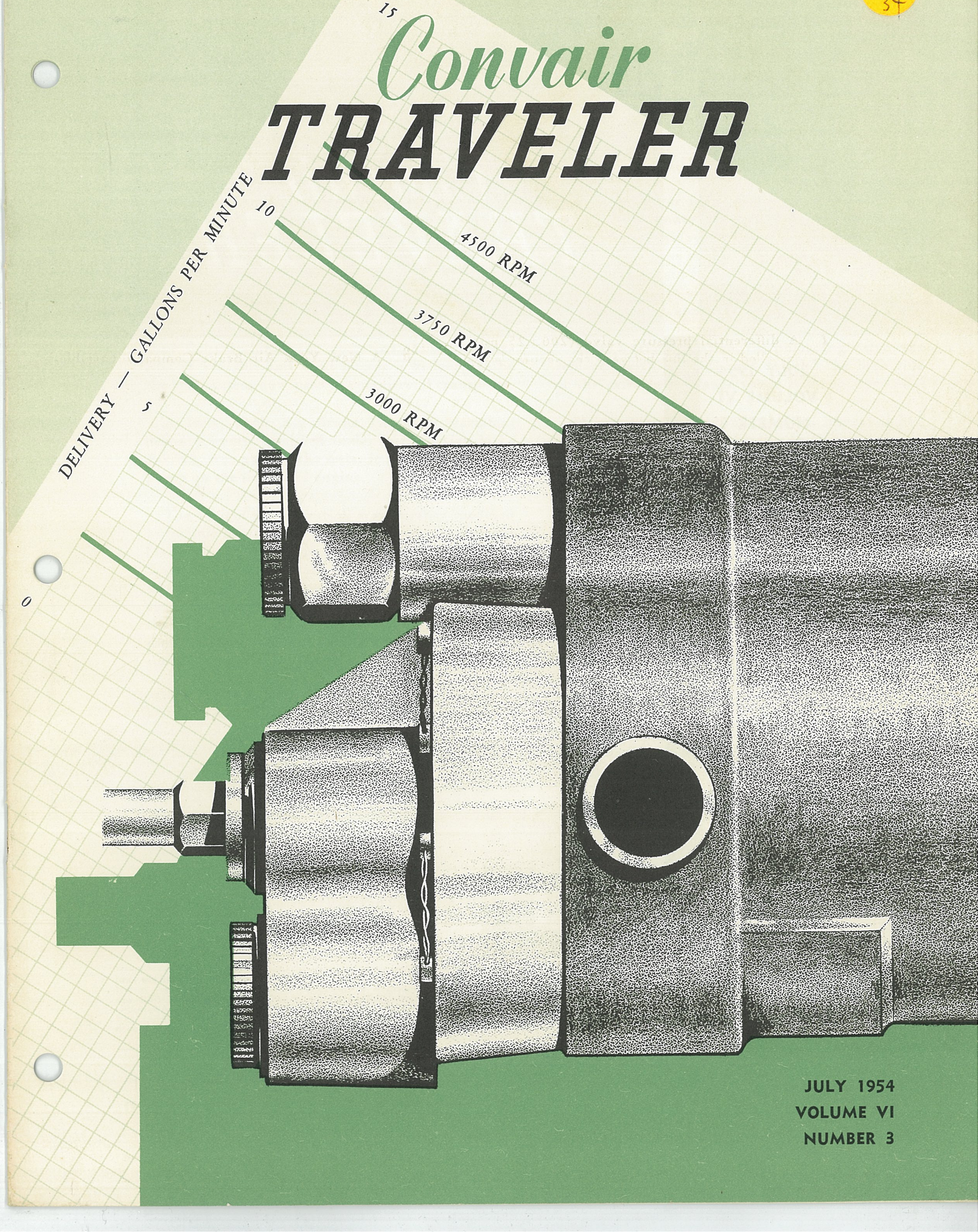
* * *



In the graphic illustration of the double clutch performance, it may be noted that, as the plane wheel speed decreases during the slip, the DECELOSTAT inertia wheel decreases at a slower rate (determined by clutch slippage). As the airplane wheel recovers speed, the inertia wheel recovery-to-airplane speed, is again effected by the clutch. The double-clutch Controller is designed with a heavy clutch on acceleration so that it should follow curve ABC from slip to full recovery, thus permitting a re-application of the brake at point C. Thus, with the double clutch Controller, two advantages are obtained: 1) the airplane wheel is protected for a longer slip period, and 2) there is less loss of time between wheel recovery and re-application of the brake.

AnX
34

Convair TRAVELER



JULY 1954
VOLUME VI
NUMBER 3

Convair TRAVELER

JULY 1954
VOLUME VI
NUMBER 3

Chief Engineer
F. W. Fink

Chief of Service
J. J. Alkazin

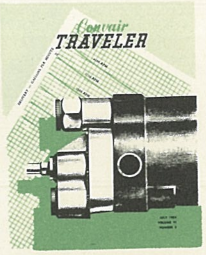
Editor
G. S. Hunter

A digest of Convair-Liner operation and service published monthly by the Service Publications Section of Convair in the interest of Convair-Liner operators and for the promotion of sales and service. Communications should be addressed to Chief of Service, Convair, San Diego 12, Calif.

Copyright 1954

FOREWORD

Evaluation and service tests of a New York Air Brake Company variable-delivery "stratopower" pump have been completed and initial kits for shipment under this program will soon be available. This issue describes the pump and its operation in the main hydraulic system of Convair-Liner 340's.

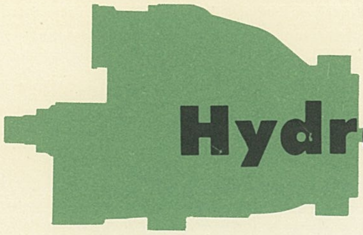


ON THE COVER

Artist Harvey Adams effectively combines a New York Air Brake variable-delivery pump and a flow diagram.

The information published in the Convair TRAVELER is to be considered accurate and authoritative as far as Convair approval is concerned. CAA approval, however, is not to be implied unless specifically noted. Airline personnel are therefore advised that use of this material may be restricted by their respective company policies or by CAA publications. Permission is hereby granted to republish any information here presented, but it is suggested that the material be verified with Convair to insure that it conforms with latest changes and developments.

CONVAIR
A Division of General Dynamics Corporation
San Diego



Hydraulic System Modification

With Variable-Delivery Pump

Several tests conducted by Convair in conjunction with 340 operators have resulted in the development of an improved Convair-Liner 340 hydraulic system.

The decision to use both a variable and a fixed pump in the system resulted from these tests and from many trouble-free hours of service-testing by four Convair-Liner 340 operators. This combination of variable and fixed pumps is believed to be the best system now used in commercial transports.

A New York Air Brake Company variable-delivery pump, qualified under Specification MIL-P-7740, was used in the tests. It replaced the fixed pump on the left-hand engine.

The system configuration was further modified to include hoses in the inlet and outlet ports of the fan motor. The left pressure line was disconnected from the tee at the front spar and new tubing was added so that fluid from the variable pump would enter the system between the unloading valve and the accumulator. The bleed line from the variable pump was routed through a filter and into the suction line of the fixed pump.

NOTE: On airplanes in service and in production the bleed line is routed directly to the reservoir, and includes bleed lines for the flap and fan motors, and the return line for the fan motor. These are shown in the schematic on pages 36 and 37.

The flow regulator at the fan was replaced with a restrictor, and hose sections were added at the inlet and outlet ports of the fan motor. A 200-psi differential-pressure valve was installed in the line between the fan and the accumulator.

For the tests, a needle valve and a flowmeter were connected between the landing gear UP and DOWN lines to simulate flows in the landing gear circuit. Pressure pickups were installed at the pump outlets, the unloader inlet, the nose gear actuating cylinder UP port, the return manifold, and at the motor inlet and outlet ports. Vacuum gages were connected at the inlet ports of the pumps. With this system configuration, an oscillograph record was made for landing gear, flap, and fan operation, and for bypass valve operation. Data were recorded at engine speeds of 800 rpm, 1100 rpm, 2000 rpm, and 2800 rpm.

After a trial operation, the unloading valve was replaced with one adjusted toward the high side of the existing tolerance range.

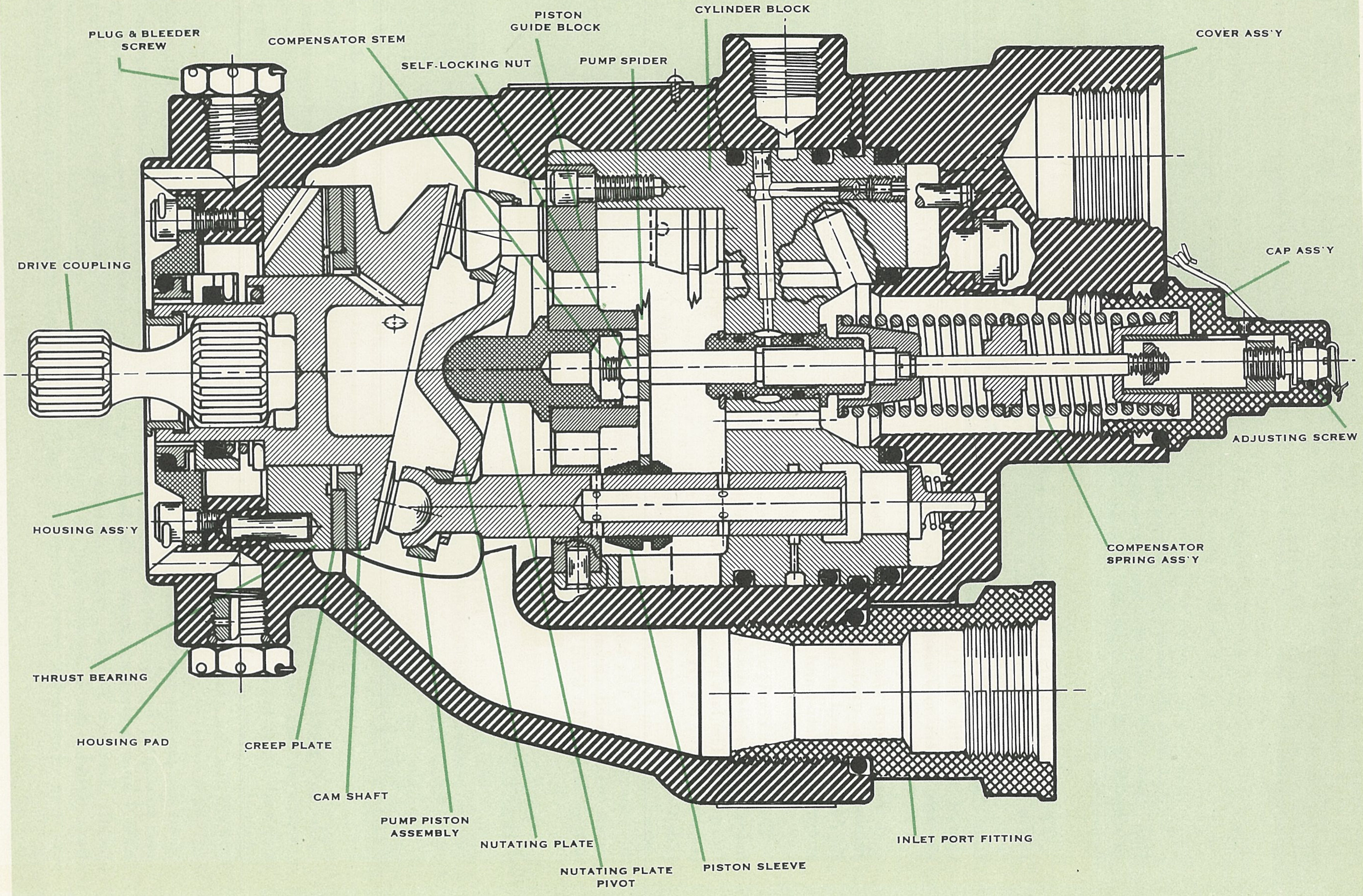
In summation, tests indicated an improved hydraulic system. Unloading valve cycling was almost entirely eliminated, regardless of system demand. Only one cycle occurred during the transition period when the fixed-displacement pump cut out and the variable-delivery pump took over.

With this combination fixed and variable delivery pump configuration, the output of the fixed pump increases during increasing engine speed and, when the output is greater than that demanded by the system, it trips the unloading valve to route the fixed pump output to the reservoir. The ensuing decrease in system pressure unfeathers the variable pump and supplies fluid to the fan at a slightly lower pressure.

With the variable-delivery pump operating at this lower pressure, the differential pressure valve, installed in the line between the fan and accumulator, maintains a maximum differential of 200±25 psi between the accumulator and fan lines. This pressure differential insures that the unloading valve will not cut in until the pressure in the fan line is approximately 200 psi below the pressure required to cut in the unloading valve. Consequently, unloader cycling does not occur as long as the variable pump speed is adequate to supply system demand.

Cycling can be expected if the variable pump is operated too slowly to supply system demand when the fixed pump flow is in excess of system demand. This situation will occur during magneto checks on the right engine when the ground cooling fan is operating, if the left engine is idled.

NYAB Stratopower Pump / cross section



As compared with the superseded circuit, flow through the unloading valve is halved since it serves the fixed pump only. As a result, return system surges are lower when the valve unloads.

The separate fan return line insures that unloader surges will not contribute to fan and flap motor seal failures. The restrictor at the fan and the attenuation of unloading valve cycling practically eliminates fluctuating fan speed with a noticeable decrease in noise level. The hoses at the fan motor ports isolate the motor from rigid connection with the hydraulic system; thus fan pressure pulsations and noise are considerably minimized.

The infrequency of unloading valve cycling and the resultant elimination of surge pressures result in quiet operation and prolonged service life of hydraulic system components.

Description of NYAB Pump

The New York Air Brake Company variable-delivery pump is an axial piston type pump with integral pressure regulation and flow control. Close-fitting pistons and individual cylinder checks enable the pump to develop intake port suction pressures approaching 1 psi absolute.

There are nine pistons set within a fixed combination valve and cylinder block. They are reciprocated by a rotating cam, and a "nutating" plate assures their positive return. The piston return action of the nutating plate is not affected by pump case pressure or by temperature conditions.

An individual positive sealing check valve at the discharge end of each cylinder enables the pump to develop intake port suction system pressure, should reservoir pressurization be lost.

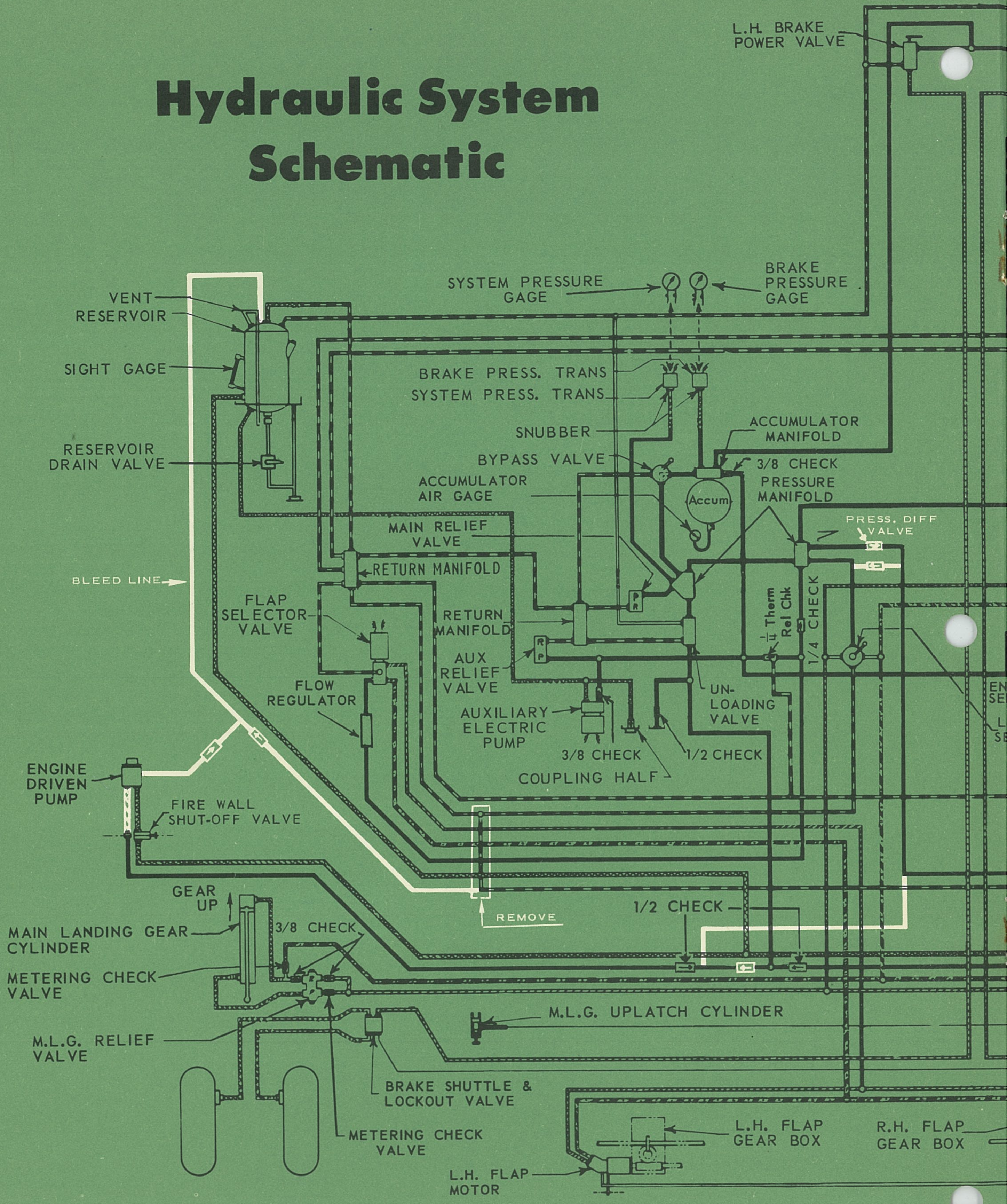
Independently rotating creep plates reduce the relative linear velocity of bearing surfaces to provide cool operation; thus, excessive heat, which accelerates wear, bearing failures and pump deterioration, is eliminated.

Pump maintenance, when required, is simple and direct. No special tools are required, and techniques are those with which all aircraft accessory maintenance facilities are familiar. Conventional pump test stands are adequate for all service checks.

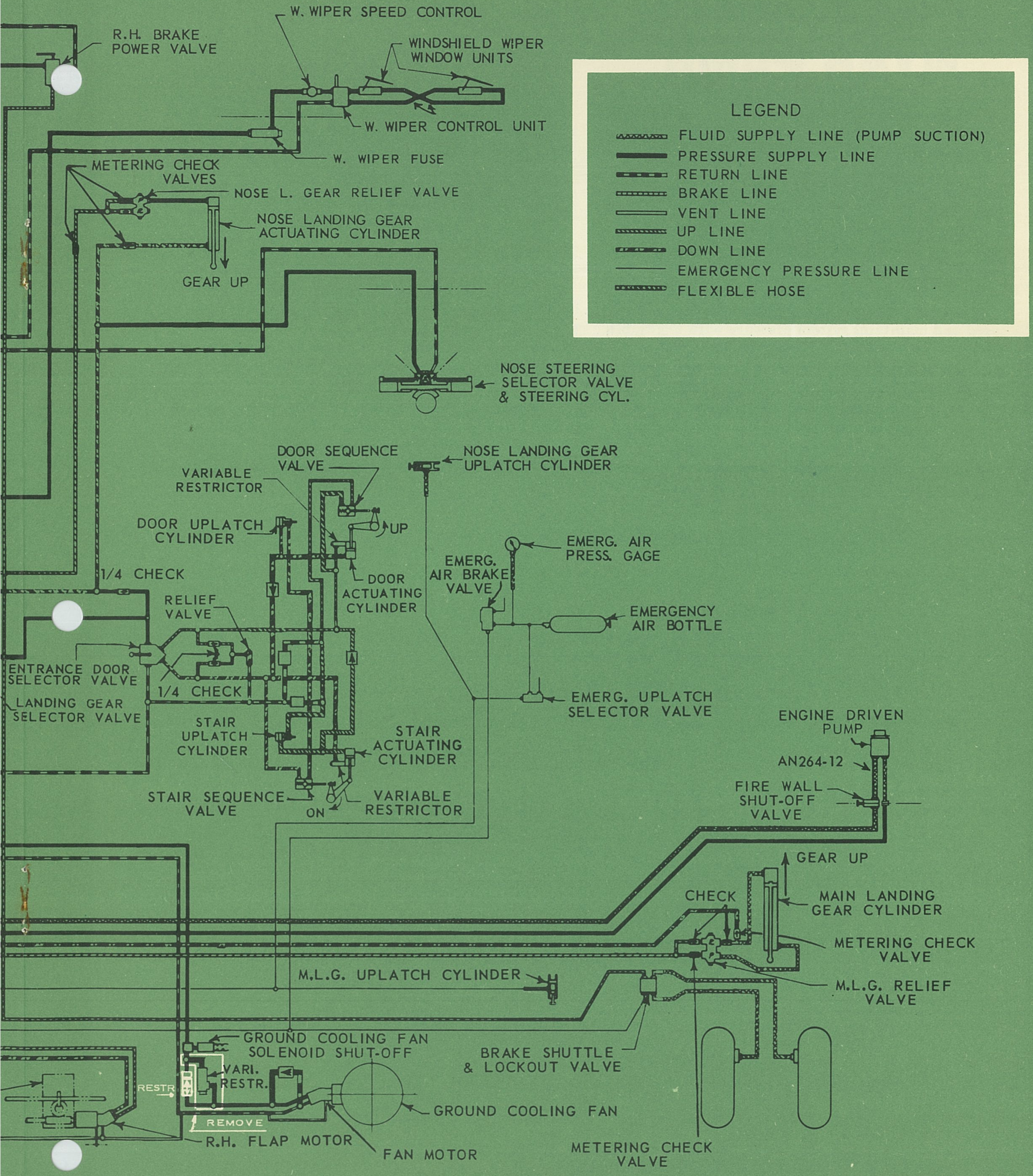
General specifications of the pump are as follows:

66WA300	For MIL-O-5606 fluid
66WM300	For Skydrol fluid
CAPACITY	Rated capacity of 3 gpm at 1500 rpm, delivery up to 9 gpm at maximum speed
MAX. DRIVING TORQUE	160 inch-pounds
MAX. DRIVING TORQUE (at max. pressure, zero flow; or min. pressure, full flow)	64 inch-pounds
MIN. SHEARING SECTION TORQUE	1200 inch-pounds
MAXIMUM SPEED (continuous)	3750 rpm
MAXIMUM SPEED (intermittent)	4500 rpm
MAXIMUM PRESSURE (continuous duty)	3000 psi
PROOF PRESSURE	125% of rated pressure at discharge port
INLET PRESSURE	65 psi maximum
ROTATION	Direction optional without internal alteration or change in port connections
MOUNTING FLANGE	Square four-hole mounting conforming to AND10261
TEMPERATURE RANGE	—65° to 200°F
THEORETICAL DISPLACEMENT	0.593 cu.in./rev
WEIGHT	13 lb dry

Hydraulic System Schematic



CHANGES MADE IN SYSTEM AS A RESULT OF VARIABLE DELIVERY PUMP INSTALLATION ARE SHOWN IN WHITE.


R.H. BRAKE POWER VALVE
W. WIPER SPEED CONTROL
WINDSHIELD WIPER WINDOW UNITS
W. WIPER CONTROL UNIT
W. WIPER FUSE
METERING CHECK VALVES
NOSE L. GEAR RELIEF VALVE
NOSE LANDING GEAR ACTUATING CYLINDER
GEAR UP
LEGEND
FLUID SUPPLY LINE (PUMP SUCTION)
PRESSURE SUPPLY LINE
RETURN LINE
BRAKE LINE
VENT LINE
UP LINE
DOWN LINE
EMERGENCY PRESSURE LINE
FLEXIBLE HOSE
NOSE STEERING SELECTOR VALVE & STEERING CYL.
DOOR SEQUENCE VALVE
NOSE LANDING GEAR UPLATCH CYLINDER
VARIABLE RESTRICTOR
DOOR UPLATCH CYLINDER
UP
EMERG. AIR PRESS. GAGE
EMERG. AIR BRAKE VALVE
1/4 CHECK
DOOR ACTUATING CYLINDER
RELIEF VALVE
EMERGENCY AIR BOTTLE
ENTRANCE DOOR SELECTOR VALVE
1/4 CHECK
LANDING GEAR SELECTOR VALVE
EMERG. UPLATCH SELECTOR VALVE
STAIR UPLATCH CYLINDER
STAIR ACTUATING CYLINDER
ENGINE DRIVEN PUMP
AN264-12
STAIR SEQUENCE VALVE
ON
VARIABLE RESTRICTOR
FIRE WALL SHUT-OFF VALVE
GEAR UP
CHECK
MAIN LANDING GEAR CYLINDER
METERING CHECK VALVE
M.L.G. UPLATCH CYLINDER
M.L.G. RELIEF VALVE
GROUND COOLING FAN SOLENOID SHUT-OFF
VARI. RESTR.
RESTR.
BRAKE SHUTTLE & LOCKOUT VALVE
REMOVE
GROUND COOLING FAN
R.H. FLAP MOTOR
FAN MOTOR
METERING CHECK VALVE

Operation of NYAB Pump

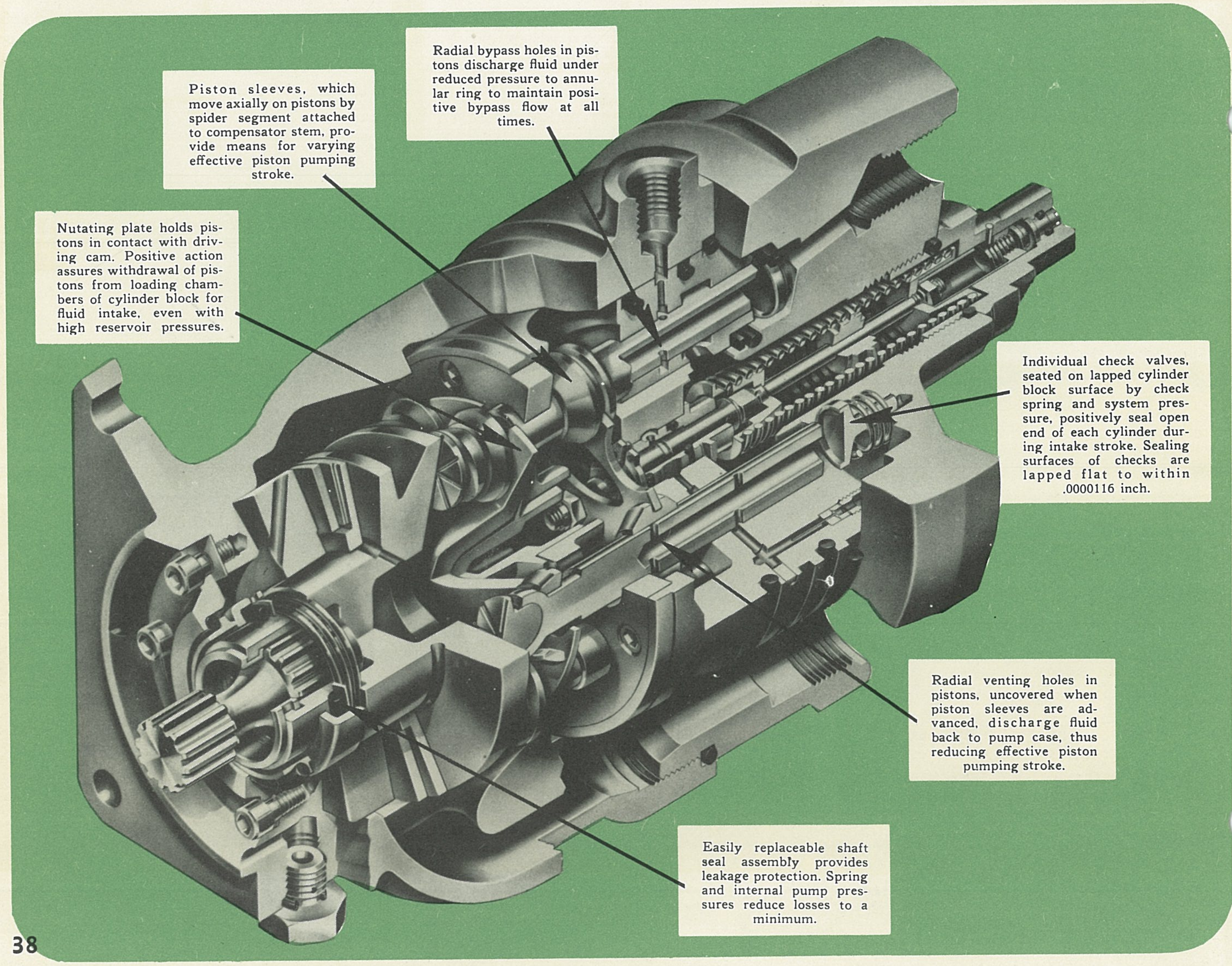
Hydraulic fluid enters the pump housing through the intake port. The rotating action of the cam shaft and the positive retractive action of the pivot-mounted nutating plate provide a reciprocating motion to the pump pistons. The forward movement of the pistons discharges the fluid past the pump checks into the pressure chamber, and full flow is registered.

Pressure regulation is achieved within the pump itself. At zero flow, the pump operates at normal speed and maintains system pressure with negligible power consumption. Demands of the system are met automatically by varying the output flow of the pump. This is accomplished by varying the effective pumping stroke of the pistons.

System pressure is maintained within a compensator control chamber where it acts on the differential area portion of a compensator stem. As the pressure over this area increases, the stem and attached piston sleeves advance. This movement, through exposure of venting holes in the pistons, provides variation of the pumping stroke to satisfy system demands between the limits of full flow and zero flow at the required pressure. An automatic pressure control device permits full flow until the predetermined flow and system pressure is reached.

When the maximum pressure is attained, the piston sleeves are fully advanced and the venting holes are uncovered for the complete piston strokes . . . then flow to the system is reduced to zero. Although the regulated maximum pressure is retained in the discharge line, only such flow is delivered as may be required to make up system leakage, should any exist. The low inertia of the regulating compensator assures instantaneous response and positive adjustment of delivery to the system.

All intake fluid passes around and over the bearing surfaces to lubricate and cool the pump during operation. Even during zero-flow operation, the positive bypass assures adequate flow of fluid through the pump.



Radial bypass holes in pistons discharge fluid under reduced pressure to annular ring to maintain positive bypass flow at all times.

Piston sleeves, which move axially on pistons by spider segment attached to compensator stem, provide means for varying effective piston pumping stroke.

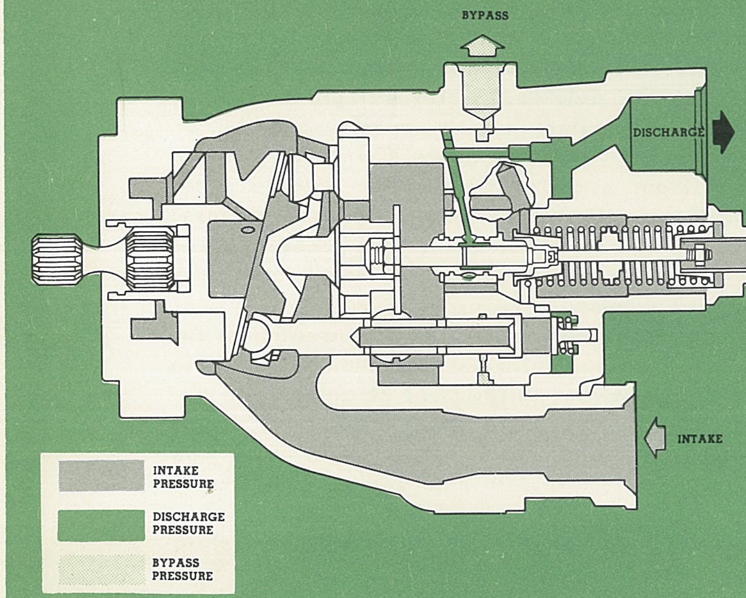
Nutating plate holds pistons in contact with driving cam. Positive action assures withdrawal of pistons from loading chambers of cylinder block for fluid intake, even with high reservoir pressures.

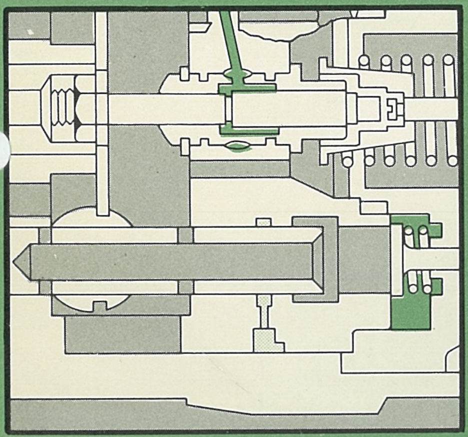
Individual check valves, seated on lapped cylinder block surface by check spring and system pressure, positively seal open end of each cylinder during intake stroke. Sealing surfaces of checks are lapped flat to within .0000116 inch.

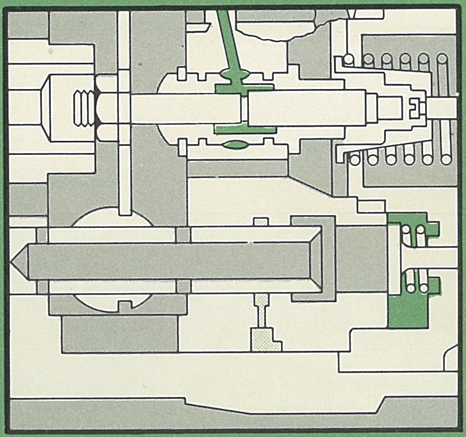
Radial venting holes in pistons, uncovered when piston sleeves are advanced, discharge fluid back to pump case, thus reducing effective piston pumping stroke.

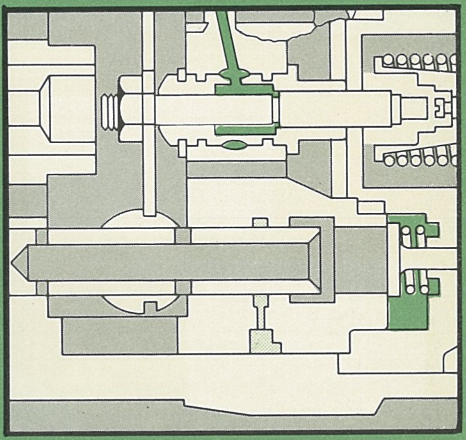
Easily replaceable shaft seal assembly provides leakage protection. Spring and internal pump pressures reduce losses to a minimum.

Operational FLOW









FULL FLOW

System pressure is well below desired maximum system or "cut-off" pressure. Pressure on differential area of stem is insufficient to overcome adjusted force of compensator spring.

The fully extended spring positions sleeves on pistons so that radial holes are covered for entire pumping stroke.

Maximum effective pumping stroke gives full delivery to system.

PARTIAL FLOW

System pressure is between 90 and 100 per cent of desired maximum.

Pressure on differential area is sufficient to partially compress compensator spring.

Piston sleeves are advanced, uncovering radial holes for a portion of the pumping stroke.

The effective pumping stroke is reduced and flow to the system is diminished.

ZERO FLOW

System pressure is at desired maximum. Pressure on differential area is sufficient to fully compress compensator spring.

Piston sleeves are fully advanced.

Effective pumping stroke and flow to system are reduced to zero.

Positive bypass flow to reservoir is maintained for cooling and lubricating pump.

System Operation

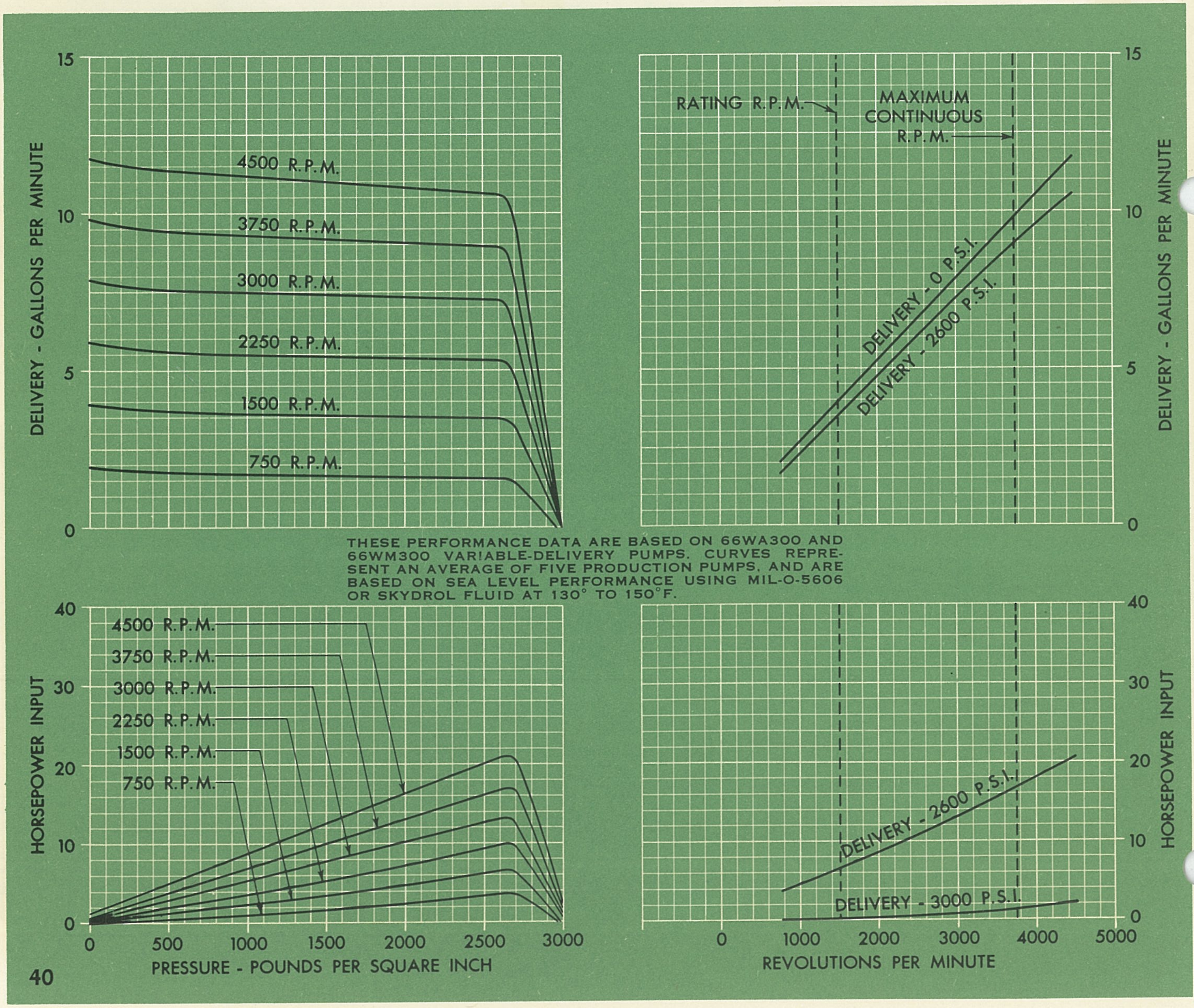
With the combination of fixed- and variable-delivery pumps, the variable pump acts as a flow governor, regulating the fluid supply in respect to the demand. For example: with the engines running at 800 rpm and ground cooling fan operating, the variable pump supplies part of the fan flow demand. As engine speed is increased, the increasing flow from the fixed-displacement pump gradually forces the variable-delivery pump into a feathered (no output) position. Accumulator pressure rises during this period. At this stage, the fixed-displacement pump alone satisfies system demands.

As engine speed is further increased, the fixed pump reaches a point where the supply exceeds the demand. When the accumulator reaches unloading pressure, the unloading valve dumps and directs the fixed pump flow directly to the reservoir.

As fan inlet pressure drops, the variable pump shifts from a feathered position toward "full make," thus supplying the fan. A further increase in engine speed results in a gradual feathering of the variable pump to maintain a flow consistent with fan demands.

As engine speed is decreased, the pressure in the fan line drops to permit the unloading valve to trip and absorb flow from the fixed pump.

OPERATION CHARTS



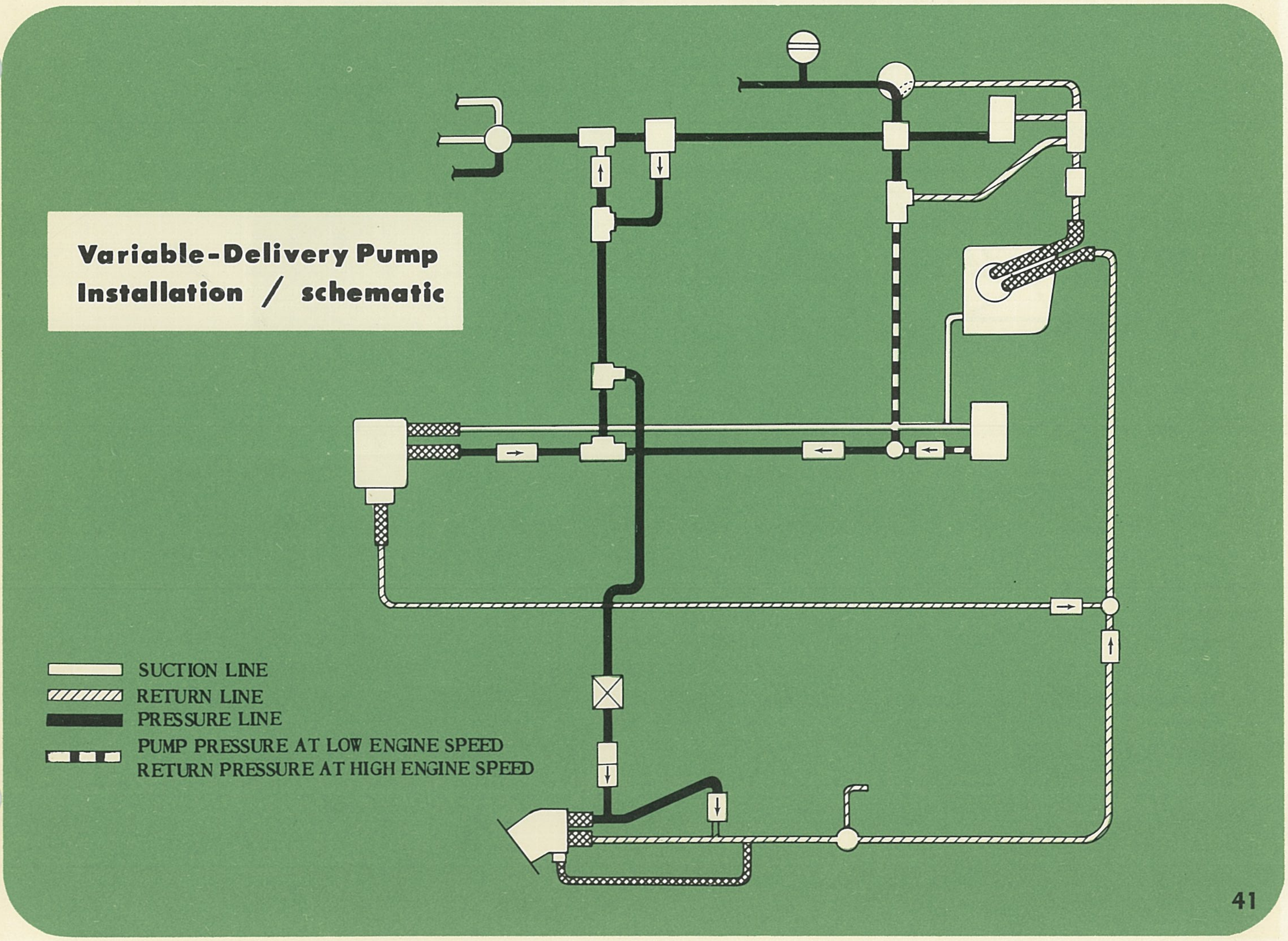
THESE PERFORMANCE DATA ARE BASED ON 66WA300 AND 66WM300 VARIABLE-DELIVERY PUMPS. CURVES REPRESENT AN AVERAGE OF FIVE PRODUCTION PUMPS, AND ARE BASED ON SEA LEVEL PERFORMANCE USING MIL-O-5606 OR SKYDROL FLUID AT 130° TO 150°F.

Hydraulic System / changes

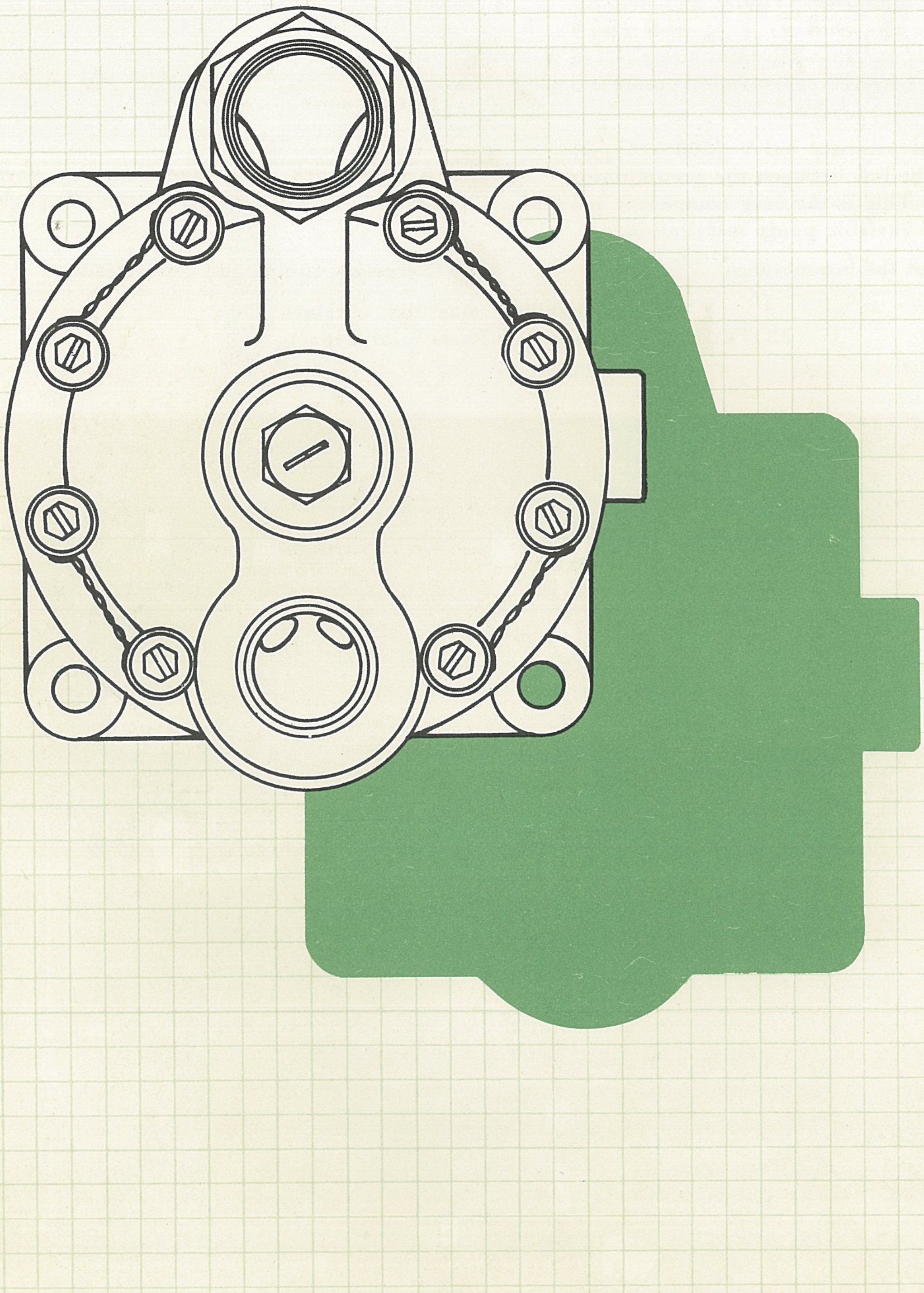
Modification of the standard hydraulic system to the variable pump configuration requires the installation of the following components:

1. Four Check Valves: a ½-inch check valve at the pressure differential valve, and one between the engine pumps; a ⅜-inch check valve in the variable-delivery pump bleed line, and one between the variable pump and the bleed line.
2. A differential pressure valve (200±25 psi) installed in the line between the accumulator and the fan. This is the only component peculiar to the variable pump installation.
3. A restrictor at the fan motor.
4. A special ½-inch hose connection at the pressure port of the variable pump.
5. Hose connections at the inlet and outlet ports of the fan motor.
6. A New York Air Brake Company variable-delivery pump installed on the left engine.
7. Necessary tubing and connections.

NOTE: Kit availability may be obtained through Convair Parts Sales Department.


Variable-Delivery Pump Installation / schematic

▭ SUCTION LINE
▨ RETURN LINE
■ PRESSURE LINE
▬ ▬ PUMP PRESSURE AT LOW ENGINE SPEED
RETURN PRESSURE AT HIGH ENGINE SPEED



Convair TRAVELER

AUGUST 1954
VOLUME VI
NUMBER 4

Convair TRAVELER

AUGUST 1954
VOLUME VI
NUMBER 4

Chief Engineer
F. W. Fink

Chief of Service
J. J. Alkazin

Editor
G. S. Hunter

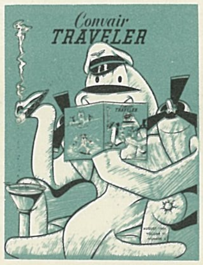
A digest of Convair-Liner operation and service published monthly by the Service Publications Section of Convair in the interest of Convair-Liner operators and for the promotion of sales and service. Communications should be addressed to Chief of Service, Convair, San Diego 12, Calif.

Copyright 1954

FOREWORD

What to do when the unexpected happens to a Convair 340—on the ground and in the air—is aptly illustrated by Bob Kingett. This issue suggests procedures for landing conditions and for fires in flight and on the ground.

A forthcoming issue will deal with engine and propeller malfunction and pressurization difficulties in flight.



ON THE COVER

The artist, Bob Kingett, shows the airplane "cramming" so that it will know what to do "when the unexpected happens," theme of this issue.

The information published in the Convair TRAVELER is to be considered accurate and authoritative as far as Convair approval is concerned. CAA approval, however, is not to be implied unless specifically noted. Airline personnel are therefore advised that use of this material may be restricted by their respective company policies or by CAA publications. Permission is hereby granted to republish any information here presented, but it is suggested that the material be verified with Convair to insure that it conforms with latest changes and developments.

CONVAIR
A DIVISION OF GENERAL DYNAMICS CORPORATION
(SAN DIEGO)

What to do when the Unexpected Happens

LANDING GEAR

Free Drop

Besides normal system hydraulic pressure and electric-driven pump pressure, the landing gear can be drop-lowered by gravity, but cannot be retracted except by hydraulic pressure.

1. Place landing gear selector valve handle DOWN. The up-locks will mechanically release when the gear selector handle is actuated. The gear will drop and lock as a result of gravity and the slipstream.
2. Normally allow three minutes for completion of the free drop.
3. Check landing gear lights and warning horn for indication of down-and-locked gear.

Uplock Release

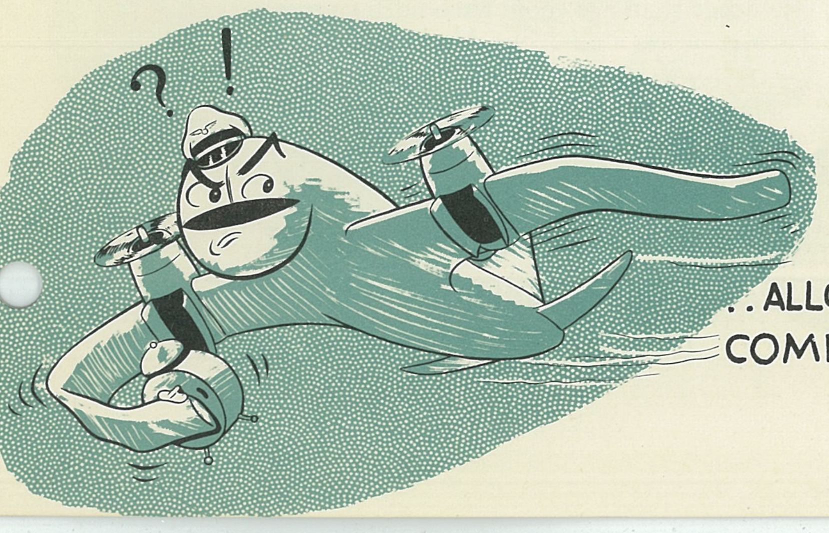
If gear does not start to extend, and hydraulic system pressure is normal, it is an indication that the uplock release cables have failed. The uplatches may be released by means of the emergency air system.

1. Place landing gear lever in DOWN position.
2. Place manual bypass handle in BYPASS.
3. Place emergency landing gear uplatch release knob in RELEASE: then return to OFF.
4. As soon as locks are released and gear has started to drop, place manual bypass handle in PRESSURE.
5. Check gear lights and warning horn for gear down and locked.

WHOOPS!
..LANDING GEAR CAN BE DROP-LOWERED BY GRAVITY...

Landing Gear Selector Valve cannot be Moved

1. Place bypass handle in bypass.
2. Place emergency gear up-lock release in REL; then OFF.
3. Check landing gear warning horn. The red landing gear warning light will go out


? !
..ALLOW 3 MINUTES FOR COMPLETION OF AIR DROP...

when all gears are locked down or up. The three green lights can be checked by removing right-hand pedestal cover and depressing microswitch.

WARNING

> Do not move manual bypass handle out of bypass, or landing gear will retract.

Following the foregoing operation, flaps, brakes, and entrance door must be operated with auxiliary hydraulic pump. Just before landing, turn on auxiliary hydraulic pump to supply pressure for braking. Check brake pressure gage; it should indicate at least 1400 psi.

Landing Gear Retraction

The landing gear can be raised only by use of hydraulic pressure supplied by the normal system or by the emergency electric-driven hydraulic pump. Use electric-driven pump, if hydraulic reservoir fluid level is low, or if both engine-driven pumps have failed. Do NOT use electric-driven pump if failure of gear to retract is due to ruptured hydraulic lines; otherwise, reserve fluid supply, which should be conserved for flap and brake operation, will be exhausted.

Retract landing gear as follows:

1. Place hydraulic selector valve handle down (in PRESSURE position).
2. Place landing gear handle up.
3. Turn auxiliary hydraulic pump on.

Landing Gear Lever Emergency Operation

If the gear-actuated solenoid fails to release landing gear DOWN lever lock automatically so that landing gear can be raised, push in emergency release button and move lever to UP position.

LANDING PROCEDURES

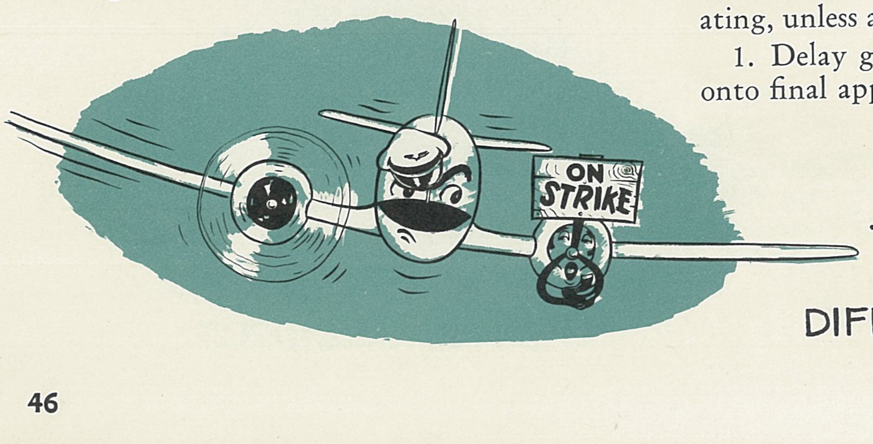
Cutting power at low airspeeds, plus increased drag caused by windmilling propellers and extended flaps, results in abrupt deceleration. Controlled safe landings can be made by maintaining power during the landing flare and until airplane touches down. After touchdown, wing flaps can be retracted to allow more weight to rest on wheels for increased braking effectiveness. As soon as the nose wheel is on the ground, throttles may be pulled back into reverse thrust range for aerodynamic braking.

If runway length is not critical, use only reverse thrust during high-speed portion of landing roll. Use nose wheel steering. Use brakes as speed decreases. Brakes are sensitive and tires may be damaged by heavy application at high speed.

One Engine Inoperative

Single-engine landing techniques are no more difficult than are those with both engines operating, unless a go-around becomes necessary.

1. Delay gear extension until after turning onto final approach leg.



.. SINGLE-ENGINE LANDING NO DIFFERENT THAN TWO...

2. Maintain final approach altitude until runway is definitely within gliding distance; then extend wing flaps full down.

3. Reduce power, allowing only sufficient time for any slight retrimming before main wheel touchdown. A slightly higher airspeed should be maintained for flareout at the increased rate-of-descent.

Note

> Nose wheel steering will give satisfactory directional control even with unbalanced reverse thrust, provided that hydraulic pressure is available. If not, use emergency air brakes instead of reverse thrust.

Both Engines Inoperative

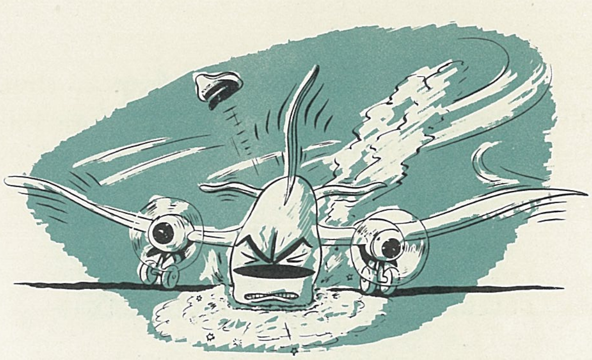
Make landing in same manner except vary approach pattern in accordance with reduced glide angle. Use brakes lightly near beginning of landing roll.

Landing with Nose Wheel Up - Main Gear Down

If main gear extends but nose wheel fails to extend:

1. Seat as many passengers as possible at aft end of airplane.
2. Make normal approach, using full flaps.

..LAND IN SLIGHTLY TAIL-DOWN ATTITUDE...



..KEEP NOSE ON RUNWAY AFTER IT MAKES CONTACT...

3. Land in slightly tail-down attitude.
4. Before complete loss of elevator effectiveness, lower nose gently to runway. After nose is on ground, use brakes gently.
5. Raise wing flaps on contact.
6. Leave battery switch on to have fire extinguisher discharge power, if needed.
7. Use elevators forcefully to lower nose gradually, but force nose to make contact with runway before elevator control is lost. Keep nose on runway after it makes contact. Use brakes lightly. Heavy brake application will cause excessive damage to nose section and will lessen rudder steering effect.

Landing with Gear Up

If only one main gear will extend, retract gear, and prepare for a belly landing.

1. Take every precaution for protection of passengers and crew, since impact of belly landing can be severe. Be sure all loose equipment is removed from hatracks and that all equipment in galley and entrance compartment is secured.
2. Jettison flares, if not needed.
3. Place hydraulic system in BYPASS.
4. Burn excess fuel, if practicable, or dump (if dump valves are installed).
5. If fire is evident, discharge appropriate CB system. (See procedures under ENGINE FIRE.)
6. Prepare for emergency passenger evacuation.
7. Make normal approach, using full flaps.

8. Just before contact: pull firewall shut-off handles; pull off electrical gang switch; turn off ignition switches; close fuel shut-off valves; turn off fuel panel emergency power-off switch.

Landing with Flat Tire

Keep airplane headed in straight landing roll by using nose wheel steering and reverse thrust. Use brakes as little as possible.

..NOSE WHEEL ALONE WILL NOT HOLD AIRPLANE IN STRAIGHT LINE...

Unscheduled Landing on Short Runway

1. Make approach in such a manner that obstacles will be cleared safely and touchdown will be made as close to beginning of runway as possible, near minimum speed.

2. Let nose wheel on ground as soon as possible, and apply reverse thrust.

3. As soon as reverse thrust is applied, use brakes as necessary. Avoid sliding tires when using brakes, since sliding of tires will cause loss of braking effectiveness.

Landing on Snow or Ice

Extreme caution must be exercised when landing or taxiing on ice. Directional control under these conditions calls for combined use of nose wheel steering, cautious application of brakes, and judicious use of power.

When reversing propeller pitch on any icy runway, apply power evenly to prevent unbalanced thrust on one engine from causing the airplane to slide sideways. The nose wheel alone will not hold the airplane in a straight line, and power will have to be balanced whether in reverse or normal pitch.

Apply brakes lightly, and release intermittently to obtain optimum brake effectiveness (unless anti-skid device is installed).

The braking action of reverse thrust enables the airplane to touch down and stop safely

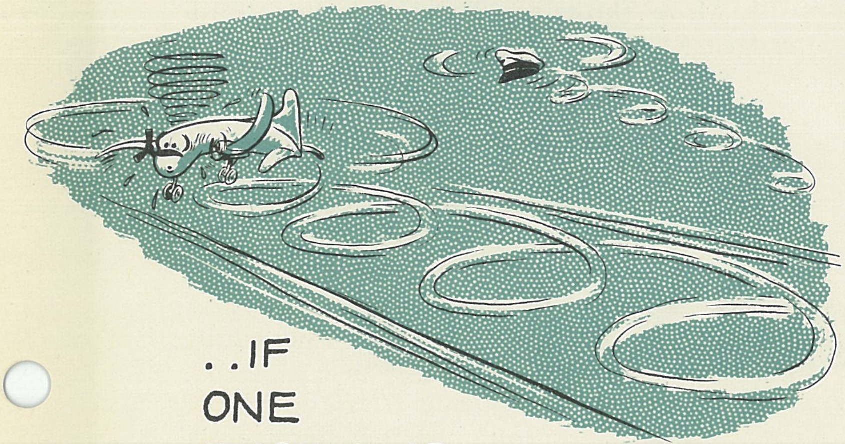
..ON SHORT RUNWAY, TOUCH DOWN NOSE WHEEL AS SOON AS POSSIBLE...

even on a slick runway. Care must be taken when reversing pitch on a runway covered with light fluffy snow or standing water so that the pilot will not be blinded by the reverse prop wash.

If landing is made on water- or slush-covered runway, turn on windshield wipers before using reverse thrust.

CAUTION

Exercise extreme caution when landing with one engine inoperative, since nose wheel steering and braking effectiveness is reduced.

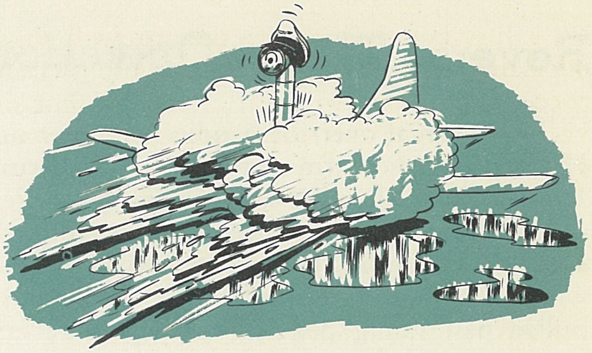


..IF ONE ENGINE IS INOPERATIVE, APPLY REVERSE THRUST GRADUALLY...

Brake Operation

In case of hydraulic brake pressure failure, and if reverse thrust is not available, use emergency air brake knob on pilot's console, as follows:

1. Operate air brake knob with right hand.
2. Move knob to HOLD. There should be no braking action at this point.
3. For braking at high speed, cycle air brake knob alternately from ON to OFF as rapidly as possible. If knob is held too long in ON position, it will cause tires to skid, with resultant loss of braking action and damage to tires.
4. After airplane has been slowed down, bring to a stop by moving knob to ON and then back to HOLD, after desired braking action is felt.



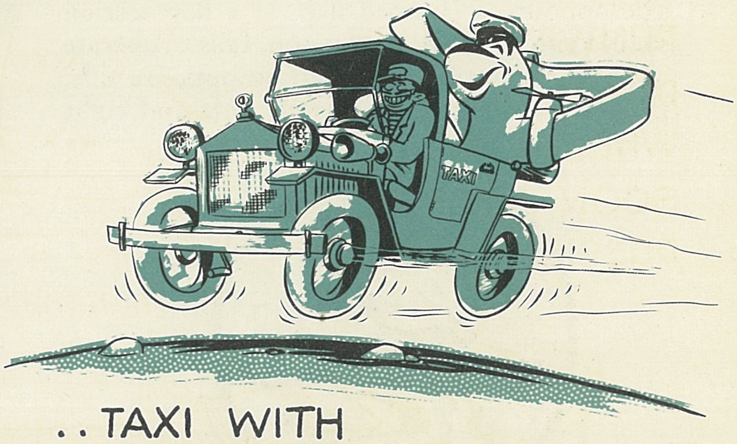
..PILOT VISIBILITY MAY BE IMPAIRED BY REVERSE PROP WASH ON SNOW- OR WATER-COVERED RUNWAY...

5. After stopping, turn emergency air brake control OFF.

Notes

Taxi with care since brakes must be bled before they are again completely effective.

A fully-charged air bottle provides for approximately eight full applications of brakes; however, if air pressure is used to release landing gear uplocks, fewer applications will be available.



..TAXI WITH CARE...

Reverse Thrust Operation

Two manual override handles on either side of the pedestal determine use of reverse thrust. During flight, handles are IN and propellers cannot be reversed. When airplane contacts ground, and landing gear struts are compressed, handles pop out permitting throttles to be pulled past idling position through a reverse power normal detent to their extreme reverse detent positions for full reverse thrust. For normal reverse thrust, throttles are retarded to their normal power detent.

If override handles do not pop out automatically, pull out manually. *Do not* pull out manual override handles until aircraft main wheels and nose wheel are firmly on the ground.

The procedure for those airplanes that incorporate a manual propeller reverse lock:

1. Close throttles.
2. Pull manual override handles.
3. Move throttles aft into reverse thrust range.

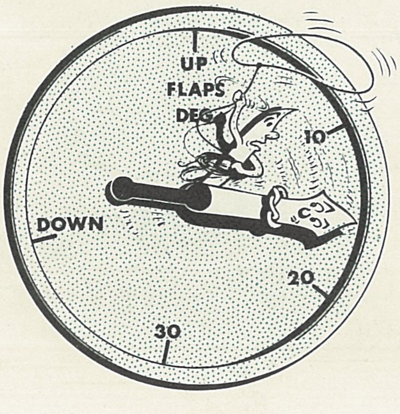
In case of electrical failure, push red button on solenoid safety lock to unlock manual override handles.

FLAP OPERATION

Operating the flap switch on pilots' pedestal energizes flap selector valve solenoid which positions valve to flaps up, or down, as selected. The landing gear warning horn will function with an interrupted sound if flaps are completely retracted and throttles are advanced for takeoff power. A push button on the pilots' pedestal will silence the horn. Check flap position indicator to determine that flaps are properly extended for takeoff.

Flap override switches cut out a flap on the side opposite a jammed flap. If a flap section should jam or, if for any reason, fails to operate in synchronization with flap on opposite side, the torque differential between left and right torque tube drive assemblies will mechanically open the circuit and shut off both drive units. This will be indicated on flap position indicator when the two arrows are out of synchronization. Override switches also stop flap operation in case of failure in one of the gear boxes or motors.

..WARNING HORN WILL FUNCTION IF FLAPS NOT SET FOR TAKEOFF...



..IF FLAP SECTIONS SHOULD JAM, TORQUE DIFFERENTIAL WILL SHUT OFF BOTH DRIVE UNITS...

Electrical Failure

If hydraulic pressure is available but flaps will not operate, it is usually an indication of failure of the selector valve solenoid.

1. Check flap control circuit breakers. If they are in, and it is definitely determined that electrical system failure is known to be the cause,

2. Operate flaps with override handle. The handle is located under a floor panel aft of pilot's seat. This control is spring-loaded to the neutral position.

3. Select desired direction, UP or DOWN, and maintain continuous visual reference with the flap position indicator. Extend or retract flaps in 5-degree increments and check for split flaps at each stage to assure that an unsafe split-flap condition does not occur when flaps are operated with manual override handle.

CAUTION

> There is no protection against a split-flap condition when the electrical system is inoperative; therefore override handle should be moved in small increments and flap position indicator watched closely during flap operation.

4. Return valve to neutral position when flaps have reached desired position. Override handle should always be returned to neutral as soon as flaps have reached UP or DOWN limit of travel in order to prevent undue stresses on flap actuating mechanism.

Note

> Hydraulic pressure must be available to operate flaps by this means.

Hydraulic Failure

If main system hydraulic pressure is not available:

1. Place hydraulic system in bypass.

2. Turn auxiliary hydraulic pump on, and check brake pressure gage for rise. If pressure is available,

3. Place wing flap switch down, or up, as required.

4. When desired extension or retraction is obtained, turn auxiliary hydraulic pump off.

FIRES

Nacelle Fire on Ground

If engine fire develops during starting procedure, continue cranking to start engine, and blow out fire. If engine will not start and ground crew signals to cut engine, proceed as follows:

1. Place mixture control in IDLE CUT-OFF.

2. Close throttle.

3. Close cowl doors.

..START ENGINE AND BLOW OUT FIRE...

Note

If fire is in Zone 1, as are most starting fires, it is not protected by the CB system. Fire must be extinguished by ground crew. CO_2 is most effectively introduced into Zone 1 through the lower open cowl doors.

4. Shut off fuel boost pump.
5. Pull out firewall shutoff valve.
6. Fire CB system if fire is in zones 2 or 3. Warn ground crew that CB system is to be used because highly volatile fumes can produce toxic effects, if inhaled.
7. Switch off ignition.

Notes

Do not restart engine until cause of fire has been determined and corrected.

Nacelle (zone 2) vent door must be reset if CB system has been used.

1 4 6 2

Airplane Fire at Blocks

1. Evacuate passengers by main entrance stairs, or follow emergency passenger evacuation procedure.
2. Notify control tower.

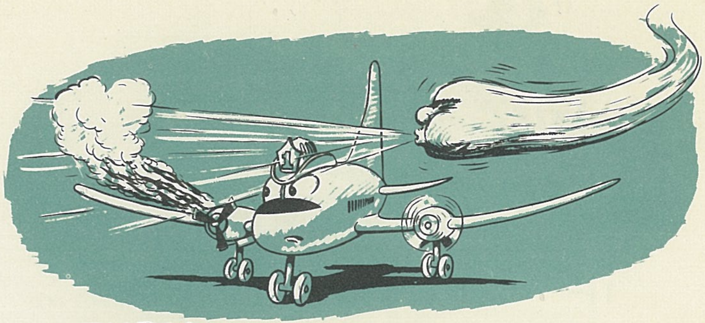
Airplane Fire away from Blocks

1. Turn airplane so that wind blows fire away from exit to be used.
2. Set parking brakes on.
3. Evacuate passengers by main entrance stairs or follow emergency passenger evacuation procedure.
4. Notify control tower.

Engine Fire in Flight

If it is determined that a nacelle fire exists in flight, perform following steps immediately:

1. Close throttle.
2. Push in feathering button.
3. Place mixture control in IDLE CUT-OFF.
4. Pull out firewall shutoff, when feathering is completed.
5. Close heat source valve control switch.
6. Close cowl doors.
7. Turn off fuel valve.
8. Select and fire main CB firing switch.
9. If fire persists, select RESERVE, and push fire button.
10. Turn fuel boost pump off.
11. Switch crossfeed off.
12. Turn off generator of inoperative engine.
13. Monitor electrical system and reduce unnecessary load.
14. Land as soon as practicable.

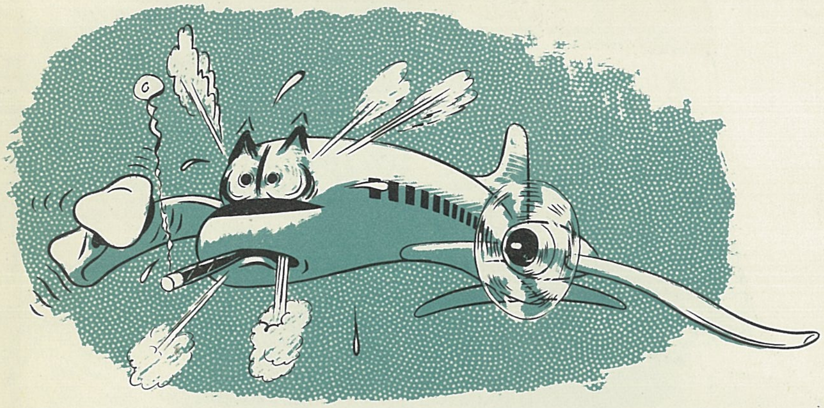


..TURN AIRPLANE SO WIND BLOWS FIRE AWAY FROM EXIT TO BE USED...

..DO NOT ATTEMPT TO RESTART ENGINE UNLESS A GREATER EMERGENCY ARISES...

Interior Fire or Smoke

At any indication of fire or smoke, start emergency descent . . . landing gear lowered and flaps extended . . . at 148 knots maximum.



14 62

Fuselage Fire

1. Crew members will don smoke masks.
2. Place cabin air and pressure control in ALT-AIR.
3. Use hand extinguishers or water from buffet to combat fire.
4. Use smoke evacuation procedure, if necessary.

Smoke Evacuation

1. Depressurize cabin, and then open either direct-vision window.
2. Open doors between pilots' and passenger compartments.
3. Open one of emergency exits located over wing. Do not open rear service door or right rear emergency exit.

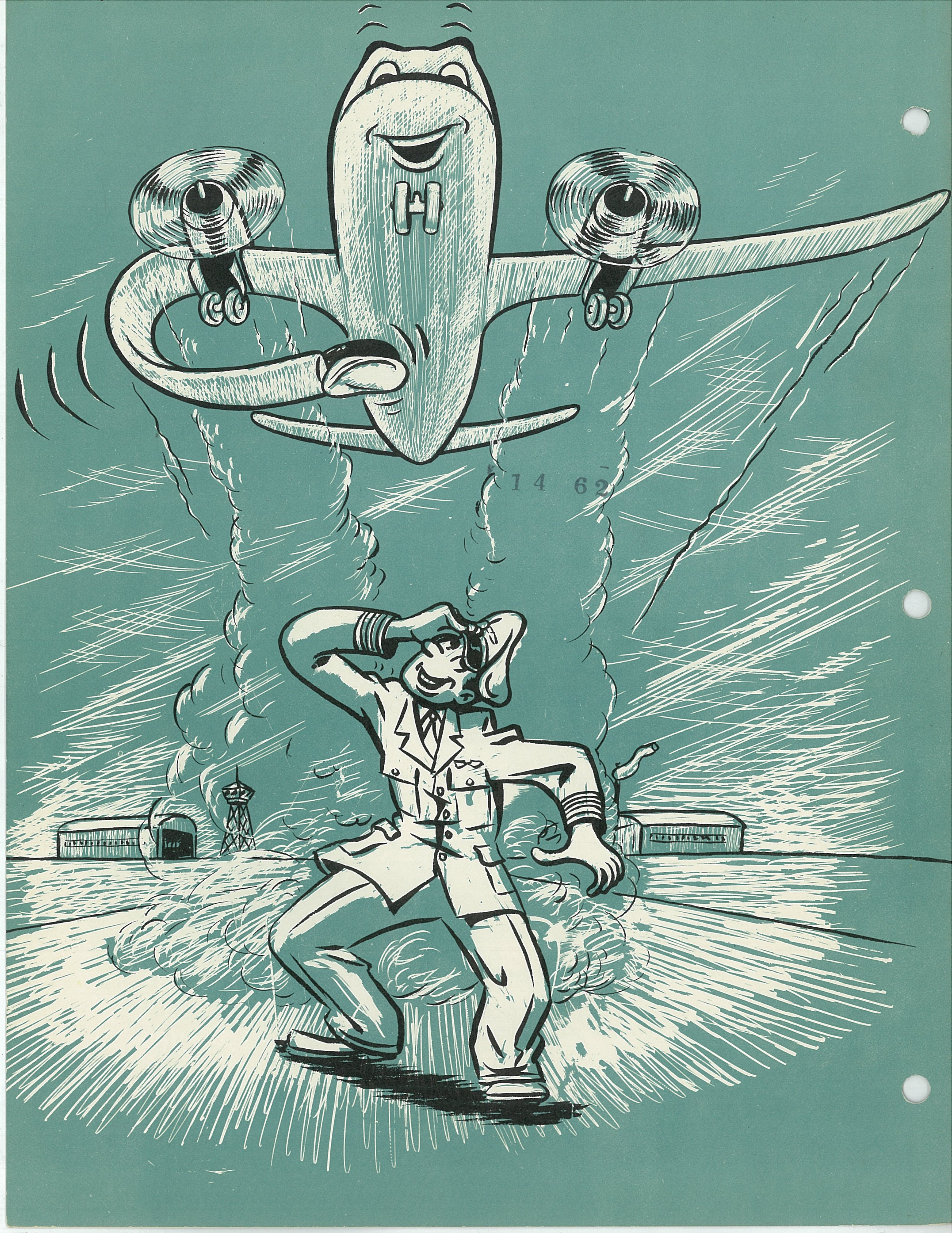
Notes

Smoke and fumes can often be eliminated by leaving cabin pressure system in operation. A matter of 5 minutes is required.

If smoke is isolated to cockpit with cockpit and cabin doors closed, cockpit can be evacuated of smoke without alarming passengers by opening pilots' sliding windows, after cabin is depressurized.

Electrical Fire

1. Depressurize airplane with manual control, and disconnect compressor.
2. Turn off all electrical equipment by operating gang switches.
3. If electrical power is lost while operating in HIGH blower, place blower shift switches in LOW to insure blower operation in low ratio when electrical power is restored.
4. Check all circuit breakers for indication of trouble.
5. Pull circuit breakers for equipment affected.
6. Fight fire with hand extinguishers.
7. Switch on A-C and D-C emergency power. Check for possible source of trouble.
8. Do not switch on electrical equipment except in extreme emergency, unless source of trouble has been definitely located and circuit isolated.



14 62

Convair TRAVELER

WHAT TO DO WHEN THE UNEXPECTED HAPPENS
SECTION II

SEPTEMBER 1954
VOLUME VI
NUMBER 5

Convair TRAVELER

SEPTEMBER 1954
VOLUME VI
NUMBER 5

FOREWORD

The August issue of the Traveler tells the pilot what to do when the unexpected happens on the ground, and when fires are encountered both on the ground and in the air.

This issue, which supplements the August issue, tells the pilot what to do if the unexpected happens to engines, propellers, and the pressurization system in the air.

ON THE COVER

The artist, Bob Kingett, gives a light touch to an important subject, "What to do when the unexpected happens."

Chief Engineer
F. W. Fink

Chief of Service
J. J. Alkazin

Editor
G. S. Hunter

A digest of Convair-Liner operation and service published monthly by the Service Publications Section of Convair in the interest of Convair-Liner operators and for the promotion of sales and service. Communications should be addressed to Chief of Service, Convair, San Diego 12, Calif.

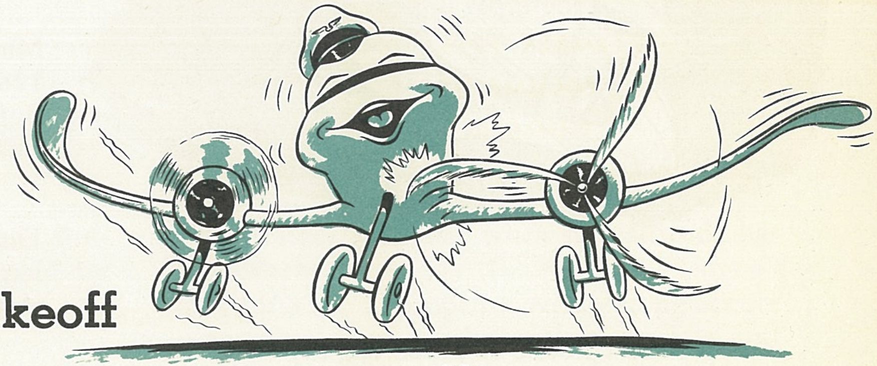
Copyright 1954

The information published in the Convair TRAVELER is to be considered accurate and authoritative as far as Convair approval is concerned. CAA approval, however, is not to be implied unless specifically noted. Airline personnel are therefore advised that use of this material may be restricted by their respective company policies or by CAA publications. Permission is hereby granted to republish any information here presented, but it is suggested that the material be verified with Convair to insure that it conforms with latest changes and developments.

CONVAIR
A DIVISION OF GENERAL DYNAMICS CORPORATION
(SAN DIEGO)

When the Unexpected Happens - - - in the air

ENGINE MALFUNCTION



.. PROPELLER WILL AUTOMATICALLY FEATHER WHEN POWER FAILS...

Engine Failure on Takeoff

To avoid confusion as to which engine has failed, use BMEP as a guide.

If engine fails *prior* to reaching V_1 (critical engine failure) speed, retard throttle and stop. Immediate closing of throttle of failed engine stops automatic feathering action and provides more drag for stopping.

If an engine fails *at* V_1 speed or above, and insufficient runway remains to stop the airplane, continue the takeoff. Lift off at V_2 (takeoff) speed, and observe the following procedure.

Note

Propeller will automatically feather, when power fails with throttles set for takeoff, before any windmilling drag can develop.

1. Raise landing gear.

WARNING

Do not attempt to retract flaps until sufficient altitude and airspeed are attained.

2. Adjust trim and maintain V_2 speed.
3. After immediate obstacles have been cleared, increase speed and retract flaps 1° for each knot in airspeed above V_2.
4. Increase speed to 125 knots.
5. Adjust power as desired, and proceed with go-around.

If time permits:

6. Close throttle of failed engine.

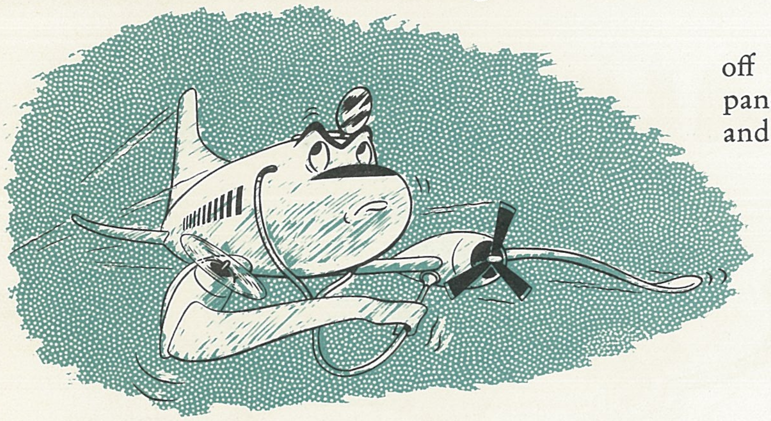
.. IMMEDIATE CLOSING OF THROTTLE OF FAILED ENGINE PROVIDES ADDITIONAL DRAG FOR STOPPING ...

7. Place mixture control in IDLE CUTOFF.
8. Pull out firewall shutoff valve.
9. Close emergency heat source valve disconnect switch on dead engine.

Note

Cabin compressor on RH side will automatically disengage if LH propeller is feathered.

Engine Failure in Flight



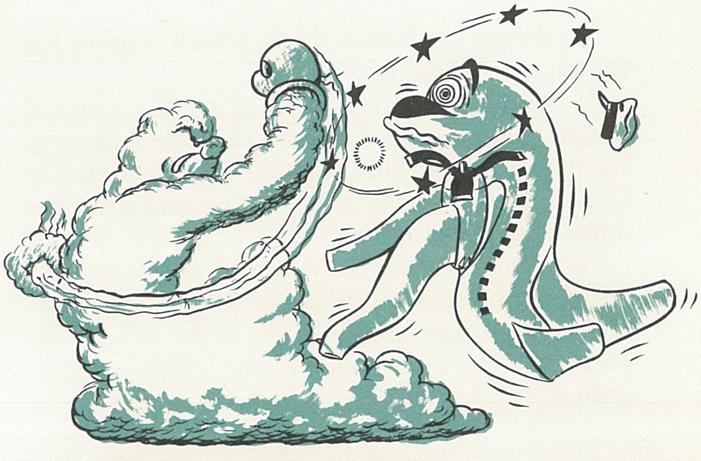
1. Retard throttle of failed engine.
2. Feather propeller of failed engine. The autofeathering button is armed only for takeoff and initial climb.
3. Place mixture control of failed engine in IDLE CUTOFF.
4. Pull out firewall shutoff valve handle for failed engine.
5. Turn off generator of inoperative engine.
6. Turn off all unnecessary electrical equipment to reduce load on remaining generator.
7. Switch off fuel tank valve and booster pump on side of inoperative engine.
8. Check for fire and fire warning.
9. Descend to altitude not requiring pressurization. Place cabin air and pressure control in ALT-AIR, after cabin is depressurized.
10. Close heat source valves (on side of failed engine) with emergency disconnect switch. If operating in icing conditions, turn off cabin heating system (on stewardess' panel). Hold switch in COLD for 60 seconds, and then turn to OFF.

Note

Minimum safe single-engine speed is 126 knots IAS in clean configuration. Buffeting may be encountered below this speed.

CAUTION

Do not attempt to restart engine unless it can be determined that it is absolutely safe to do so.

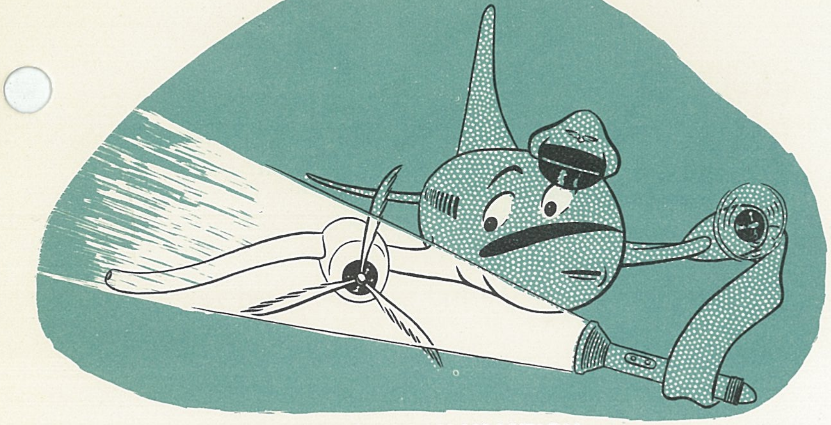


..BUFFETING MAY BE ENCOUNTERED BELOW 126 KNOTS WITH SINGLE ENGINE...

Engine Restarting in Flight

Keep airspeed below 150 mph (130 knots). If unfeathering is accomplished at night, use wing illumination or landing lights to observe propeller operation Do not use tachometer for determining when unfeathering is to be terminated.

1. Determine that mixture control is in IDLE CUTOFF and that throttle is closed.



..USE WING ILLUMINATION OR LANDING LIGHTS TO OBSERVE UNFEATHERING AT NIGHT...

2. Push firewall shutoff control handle.
3. Place propeller control in full high pitch (DECR RPM).
4. Hold out feather button and watch propeller during unfeathering. Release button when propeller rotation starts (normally one to two seconds).
5. Wait until propeller is being governed properly at approximately 1200 rpm before proceeding: then turn ignition to BOTH; place spark advance control (if installed) to NORMAL; place mixture in AUTO-RICH.
6. Operate engine at low rpm until temperatures rise to minimum operating limits.
7. Adjust power as required.

Engine Overspeeding

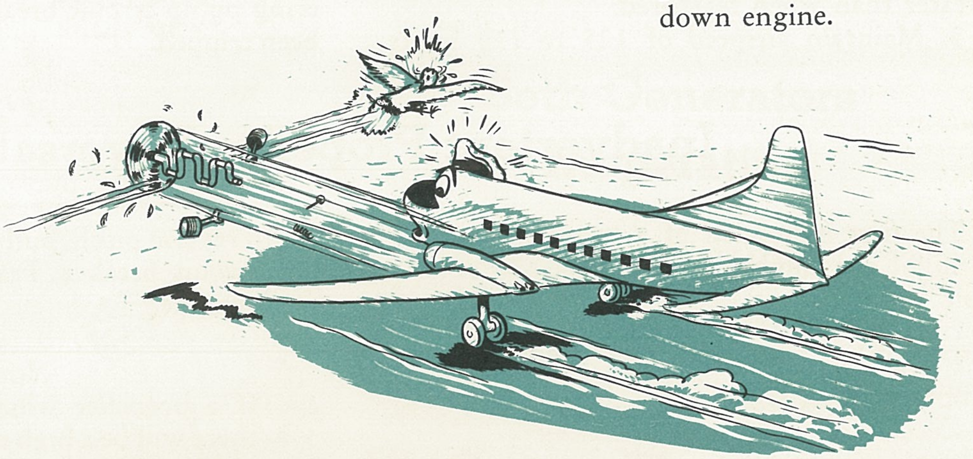
AT TAKEOFF. If propeller overspeeds during takeoff, and rpm cannot be reduced by using propeller speed control, proceed as follows:

1. Push manual feathering button in; then pull it half out as rpm drops.
2. If governor does not regain control, push feather button intermittently to maintain 2800 rpm. Continue this procedure rapidly and at short intervals to allow continued operation of engine at takeoff power.
3. Feather propeller when safe altitude has been reached.

IN FLIGHT. If propeller overspeeding occurs at cruising speed or above, close throttle and push feather button momentarily to decrease rpm slightly below 2800.

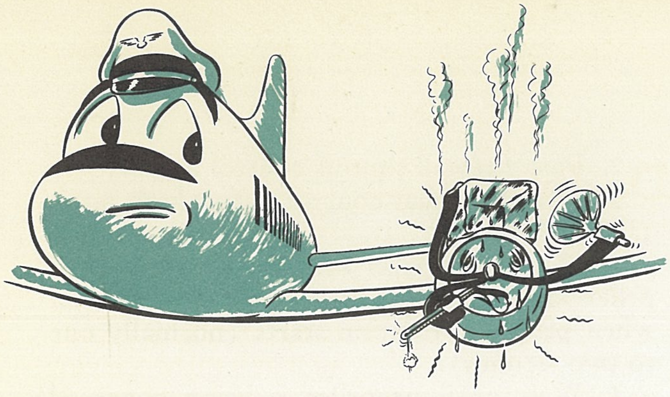
This should allow governor to regain control for normal propeller operation. If governor will not control the rpm, attempt to feather propeller. If propeller will not feather, decrease speed to lowest practicable and shut down engine.

..IF PROPELLER OVERSPEEDS DURING TAKEOFF, PUSH MANUAL FEATHERING BUTTON IN...



Detonation

The following factors contribute to tendency of an engine to detonate: excessive manifold pressure, insufficient cooling, lean fuel-air mixtures, continued operation with



. . INSUFFICIENT COOLING CONTRIBUTES TO DETONATION . . .

carburetor air temperature above maximum continuous rating, faulty ignition system, and fuel of low anti-knock (octane) value. The first four factors can be controlled from the flight compartment.

If detonation occurs:

1. Reduce power.
2. Open nacelle flaps and increase speed for better cooling.
3. Enrich mixture.
4. Reduce carburetor air temperature.

PROPELLERS

Failure to Feather

If propeller will not feather because feather button will not stay pushed in, check circuit breaker. If it will not stay in, manually hold both buttons (circuit breaker and feather) in until feathering is completed.

If propeller does not feather normally:

1. Reduce airspeed to that for best climb speed, corresponding to wing flap setting being used.
2. Place propeller speed control in full DECR RPM. At this setting, windmilling drag will be at a minimum although considerably greater than when feathered.
3. Maintain airspeed of 125 to 130 knots IAS with landing gear and wing flaps up, adjusting power on good engine, as required.

Note

If windmilling rpm is too high, it can be lowered by reducing altitude. Windmilling is a function of true airspeed.

Failure to Unfeather

If propeller will not unfeather, check feathering pump circuit breaker, and reset if it has been tripped.

Inadvertent Propeller Reversal

The first indication of a propeller reversal in flight is a momentary overspeeding condition.

1. Close throttle on malfunctioning engine.
2. Push feather button. Stop feathering if propeller governs properly in forward pitch; proceed normally.
3. If propeller shows indication of returning to reverse pitch, pull propeller reverse control circuit breaker. Feather and proceed on single engine.

Note

If a propeller windmills in reverse, there will be a high manifold pressure reading with no indication of rpm.

Unfeathering

See STARTING ENGINE IN FLIGHT.

Propeller De-Icing

Abnormal operation of propeller de-icing system is indicated by one or both circuit breakers popping out to tripped position.

1. Reset circuit breaker. Failure of circuit breaker to stay reset indicates that propeller cannot be thermally de-iced.
2. When uneven de-icing of blades is indicated, remove ice by intermittently varying engine rpm. *Uneven de-icing of blades can result in propeller unbalance and engine failure.*

ELECTRICAL SYSTEM MALFUNCTION

Both Inverters Inoperative

With pilots' flight instrument switches in emergency positions, engine-driven alternators will supply A-C power for turn-and-bank indicators, gyro horizons, and C-2 compass (as a directional gyro for pilot only).

1. Place pilot's instrument power selector in EMERGENCY.
2. Place copilot's instrument power selector in EMERGENCY.

Note

For best emergency instrument operation, engine rpm should be at least 2000.

3. Place audio selector panel emergency switch in EMERGENCY. This switch in emergency position allows use of VHF and HF transceiver and D-C radio equipment.

.. TURN OFF ALL UNNECESSARY ELECTRICAL EQUIPMENT...

Both Generators Inoperative

With both generators inoperative, it will be necessary to switch to emergency A-C power, as described in preceding paragraph.

Pull off power panel gang switch. Battery power will be supplied for fire detection and extinguishing systems, compass light, fuel system controls, flare release solenoids, instrument panel white lights, check-list light, and D-C power reset.

With battery switch off, landing gear warning horn and lights are inoperative, and wing flaps can be operated only with manual override handle.

Circuit Breakers

1. Hold propeller feathering circuit breakers in, if necessary, when feathering or unfeathering a propeller. Holding breaker in against an overload should be done with full realization that extensive damage to equipment may result.

2. Hold fuel shutoff valves and crossfeed valve circuit breakers in, if necessary, while positioning fuel valves to their desired positions.

3. Hold fuel booster pump circuit breakers in, if necessary, in order to operate pumps.

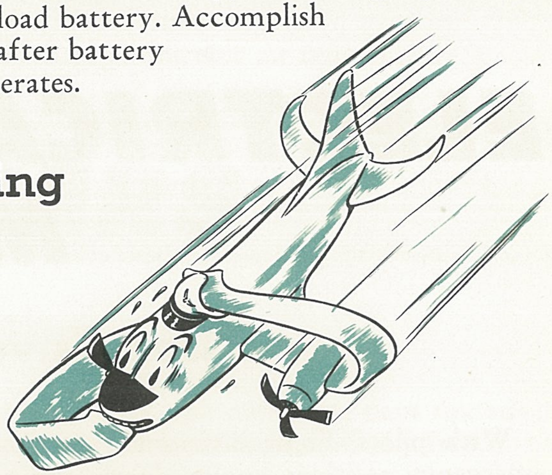
4. Reset generator circuit breakers by momentarily holding generator control switch at RESET position. If reset cannot be made because of a low battery, turn off gang switch to unload battery. Accomplish reset after battery recuperates.

Crash Landing

1. Place pilot's instrument power selector in EMERGENCY.

2. Turn off fuel panel emergency power-off switch.

3. Pull power panel gang switch.



PRESSURIZATION DIFFICULTIES

Emergency Depressurization

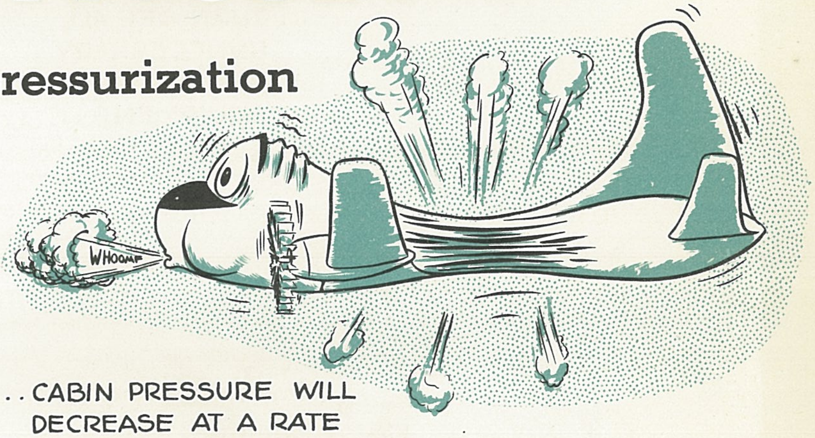
1. Pull manual dump control handle.

2. Place cabin air and pressure control in ALT-AIR.

3. Descend to altitude that does not require pressurization.

Note

The cabin pressure dump valve cannot be reset in flight once cabin pressure has been dumped by this method.



..CABIN PRESSURE WILL DECREASE AT A RATE POSSIBLY UNCOMFORTABLE TO PASSENGERS...

Cabin Pressurization Irregularities

Secondary Compressor Vibration	Move cabin temperature selector a few degrees clockwise.

Compressor Lube Pressure less than 45 psi or Compressor Power Pressure over 2250	Disconnect emergency compressor disconnect. After cabin pressure differential is reduced to low value, place cabin air and pressure control in ALT-AIR.

Note

Correct fault in following sequence. It may not be necessary to continue through all steps.

Compressor Power Pressure erratic or Compressor Lube Temperature over 107°	Set cabin temperature selector switch warmer. Set cabin rate-of-change to green band. Set cabin altitude selector to airplane altitude. When cabin is depressurized, set cabin air and pressure control in ALT-AIR. If erratic pressure continues, disconnect emergency compressor disconnect.
Cabin Altitude erratic	Set cabin rate-of-change to green band. Set cabin altitude selector at airplane altitude. If condition continues, place cabin air and pressure control in ALT-AIR. If this does not change condition, pull emergency dump valve.

Evidence of Door or Window Failure

STEWARDESS.

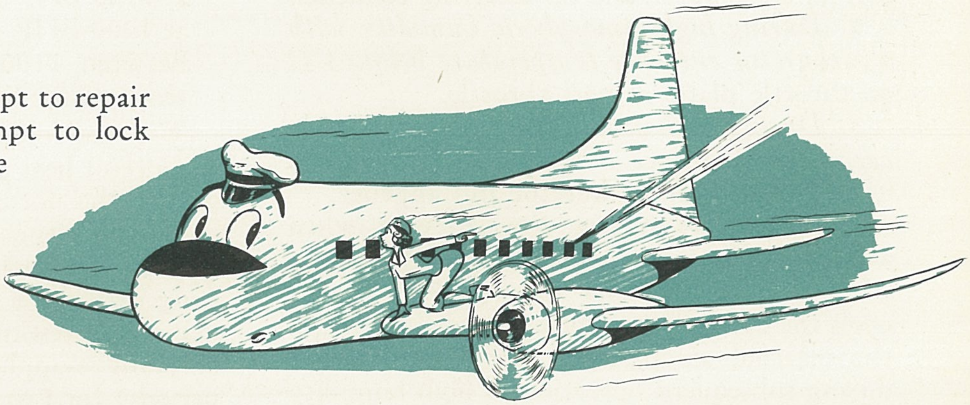
1. Notify pilot immediately if window or door failure is suspected. DO NOT USE INTERPHONE, IF LEAK IS AT REAR SERVICE DOOR. STAND CLEAR OF DOOR.
2. Remove adjacent passengers, and keep clear.
3. Check seat belts.

CAUTION

Do not examine or attempt to repair any leaks. Do not attempt to lock door if it appears to be unlocked.

PILOT.

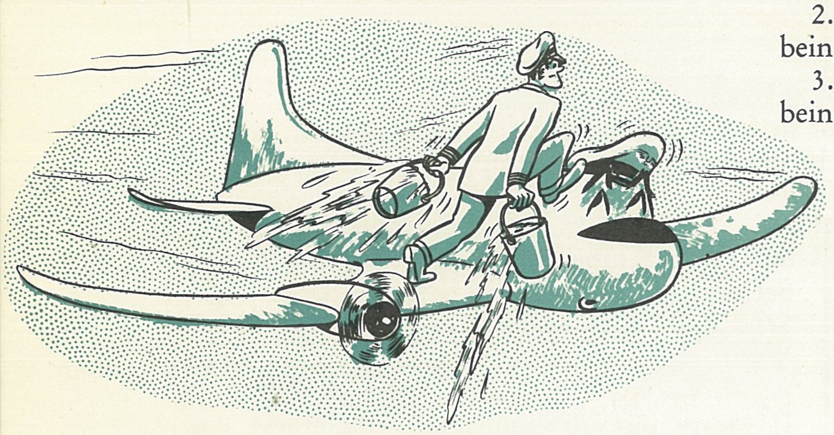
1. Place cabin air and pressure control in ALT-AIR.
2. Descend to altitude not requiring pressurization.
3. Turn on NO SMOKING and FASTEN SEAT BELT signs.



.. STEWARDESS NOTIFY PILOT IMMEDIATELY OF FAILING WINDOW OR DOOR...

Fuel System Emergency

To cross-feed fuel from either tank to both engines:



1. Break safety wire, and place cross-feed switch ON.
2. Turn off fuel valve switch on tank not being used.
3. Turn off fuel booster pump of tank not being used.

CAUTION

Do not attempt to transfer fuel from one tank to another. To do so may result in overflow of fuel from vent. The system is not designed for transfer from tank to tank and such procedures are prohibited by CAA.

Windshield Anti-Icing

14 62

If windshields and pilot's D-V panel will not anti-ice, check fuses and/or try other switch positions for partial anti-icing. If one inverter fails, set windshield anti-ice control switch to CAPT INV #1 or CAPT #2 position, according to which inverter has failed.

Carburetor Ice

Loss of power while flying through visible moisture conditions at or near freezing temperatures may be due to carburetor ice. Indications of carburetor icing generally appear as either a drop in manifold pressure, a change in fuel flow, a drop in torque pressure, and/or surging or misfiring.

CARBURETOR ICE CAN FORM:

1. *In visible freezing or subfreezing moisture* in airscoop, in and on metering elements.
2. *During high atmospheric humidity with a carburetor entrance temperature below 3°C* on throttle plates at part throttle.
3. *During high atmospheric humidity with carburetor entrance temperature below 10°C* in region between carburetor and impeller.
4. *During severe low temperatures,* when aircraft has been exposed for many hours, lowering fuel temperature to a point where it cools the carburetor sufficiently to form ice in the internal air passages of the carburetor, during subsequent operation in high humidity atmosphere.

TO PREVENT CARBURETOR ICE. Maximum allowable continuous carburetor heat applied *before* encountering icing conditions will prevent carburetor icing. Apply preheat air 5 to 10 minutes prior to entering visible moisture under freezing conditions:

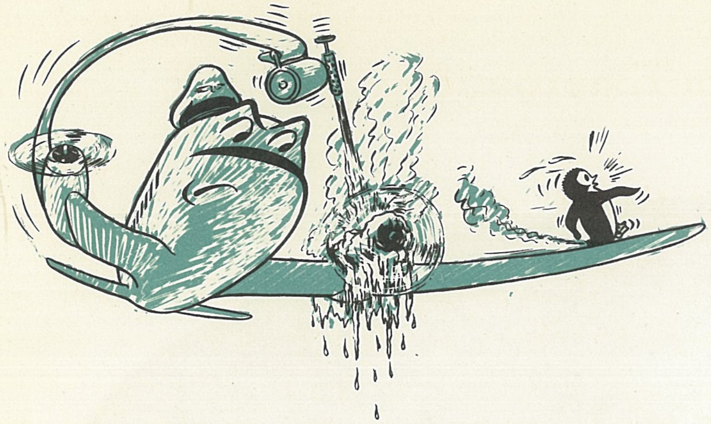
Low Blower: 20 to 25°C (maximum continuous) = 38°C Auto-Rich.

High Blower:

at 1100 BHP or less = 27°C
at 1200 BHP = 15°C

Between 1100 and 1200 BHP, maximum temperature allowable can be interpolated.

With the foregoing C.A.T. limits, prescribed carburetor heat can be consistently maintained during the normal temperature drop experienced after encountering icing conditions. If entered without preheat internal carburetor icing may cause loss of power without loss of manifold pressure. Internal icing may require constant re-application of full heat (30-second periods) for 5 to 15 minutes before full normal operation returns.



..APPLY FULL CARBURETOR HEAT...

If Auto-Rich mixture does not provide adequate fuel flow under carburetor heat conditions, use all-engine-prime as required.

IF ICE FORMS BEFORE PREVENTIVE ACTION IS TAKEN:

1. Shift to 20° spark advance (if 25° is being used).

2. Shift to Auto-Rich mixture, and maintain until desired power is stabilized.

3. Rapidly apply full pre-heat capacity and hold for approximately 30 seconds.

4. Check to see if manifold pressure and torquemeter pressure are restored by *slowly* returning preheat control toward cold position.

Notes

Application of preheat air at high altitude will in itself cause an appreciable decrease in engine power output because of, a) the reduced air flow through engine, and b) leaning effect due to over-compensation of automatic mixture control unit. Latter may be offset by shifting to Auto-Rich when maximum continuous preheat is being used.

It may take 5 to 15 minutes to stabilize normal power and fuel flow after application or removal of preheat.

14 62

Wing and Tail Anti-Icing

When entering icing conditions, place augmentor vanes in maximum closed position, and use cowl doors to control cylinder head temperatures (not more than mid position).

If an engine should fail while operating in icing conditions:

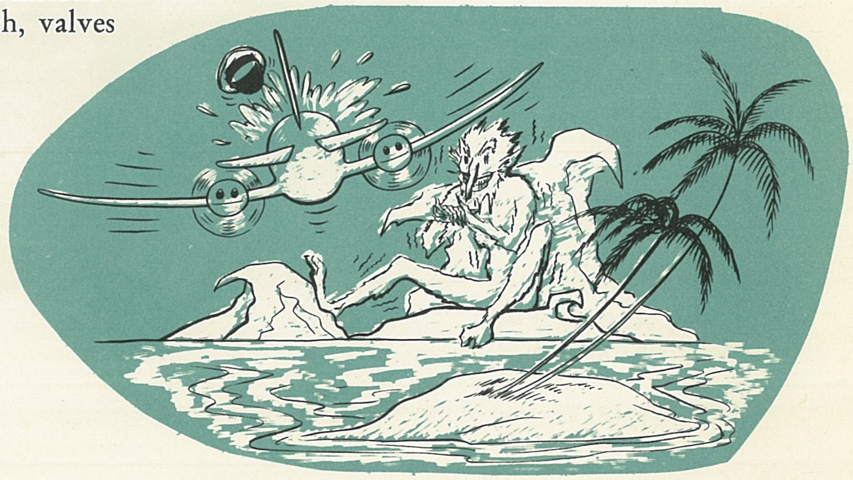
1. Close heat source valves of inoperative engine with emergency disconnect switch. Heat source valves may be reconnected by placing emergency disconnect switch in OFF position and placing starter arming switch in START position for 15 seconds. If this instruction does not appear below the switch, valves cannot be reconnected in flight.

2. Turn off cabin heat.

3. Open cowl doors to mid position and close augmentor vanes to 80° position. If overheat warning bell rings, reset vanes to lesser closure.

4. Adjust cowl flaps to maintain cylinder head temperatures (230° to 260°C). Do not exceed mid position.

5. Reset augmentor to lesser closure if cowl door mid position does not maintain cylinder head temperatures within limits.



..WHEN ENTERING ICING CONDITIONS, CONTROL CYLINDER HEAD TEMPERATURES...

Convair TRAVELER
keep these two issues together-
Convair TRAVELER
WHAT TO DO WHEN THE UNEXPECTED HAPPENS SECTION II

14 62

REMEMBER: If in doubt, check CAA Approved Flight Manual . . . your guiding factor.

Convair TRAVELER

NOVEMBER 1954
VOLUME VI
NUMBER 7

Convair TRAVELER

NOVEMBER 1954
VOLUME VI
NUMBER 7

FOREWORD

Adherence to operating limitations as prescribed by CAR 4b is the first requisite for safety. Although these limitations may seem to be strict and complex, it must be agreed that the reasons behind them are in the best interests of flying safety.

The application of the takeoff performance section of CAR 4b to Convair-Liner 340 aircraft is discussed in this issue, together with information for the reading of charts in the 340 Flight Manual. It should be noted that the data in these charts are conservative and that the airplane easily demonstrates the performance shown.

Landing performance and weight and balance will be discussed in a forthcoming issue.

ON THE COVER

The artist, Bob Kingett, has a clever way of giving a "sneak" preview of the contents of an issue. In this one . . . you've guessed it . . . we discuss takeoff performance as regulated by CAR 4b.

Chief Engineer
F. W. Fink

Chief of Service
J. J. Alkazin

Editor
G. S. Hunter

A digest of Convair-Liner operation and service published monthly by the Service Publications Section of Convair in the interest of Convair-Liner operators and for the promotion of sales and service. Communications should be addressed to Chief of Service, Convair, San Diego 12, Calif.

Copyright 1954

The information published in the Convair TRAVELER is to be considered accurate and authoritative as far as Convair approval is concerned. CAA approval, however, is not to be implied unless specifically noted. Airline personnel are therefore advised that use of this material may be restricted by their respective company policies or by CAA publications. Permission is hereby granted to republish any information here presented, but it is suggested that the material be verified with Convair to insure that it conforms with latest changes and developments.

CONVAIR
A DIVISION OF GENERAL DYNAMICS CORPORATION
(SAN DIEGO)

TAKEOFF WEIGHT LIMITATIONS

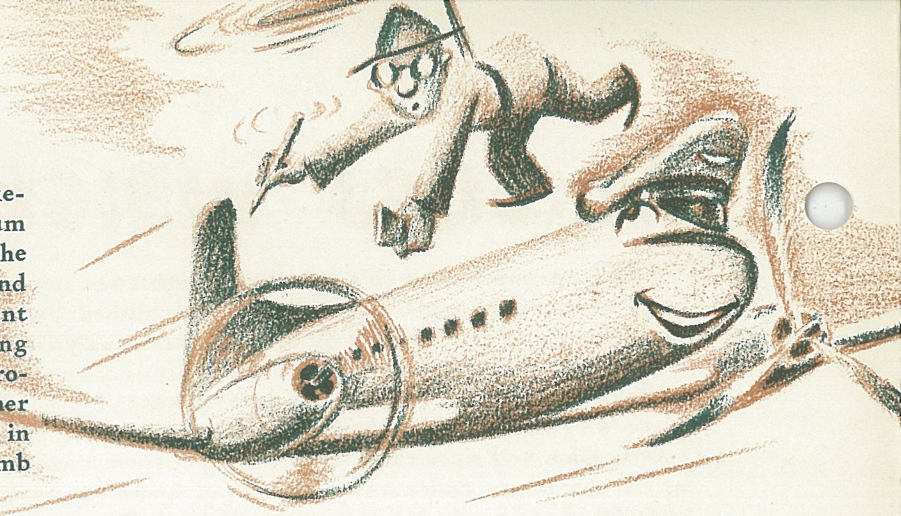
The maximum allowable operating weights for any airline airplane certified under CAR 4b are established by either performance of the airplane or by structural analysis. Operating weights established by structural analysis are considered to be the maximum, regardless of performance abilities. Since these weights are established by the manufacturer prior to certification and since the operator must observe these values as the maximum under any condition of operation, it is not considered of specific interest at this time to discuss the basis for structural gross weight limits.

Gross weight limitations established on the basis of airplane performance on the ground and in flight are variable and may be based on any one of several performance requirements prescribed in CAR 4b. Since these gross weights must be established by the operator for each flight it is considered essential to discuss the limitations and their effect on the operation of the airplane.

The maximum takeoff gross weight for a specific condition may be limited to a value less than the maximum structural gross weight by any one of the following factors: 1) climb performance, 2) available takeoff runway length, 3) obstacle clearance, and 4) terrain clearance enroute.

The required climb performance is specified by CAR 4b and in most instances is based on the stall speed of the airplane. Following are the various climb configurations and the minimum climb requirements.

FIRST TAKEOFF SEGMENT. The first takeoff climb segment is required to have a minimum rate-of-climb of 50 ft/minute. The configuration for this segment consists of wing flaps in takeoff position, gear extended, one engine inoperative with propeller windmilling on the low-pitch stops, the other engine operating at takeoff power, cowl doors in takeoff cooling position, and airplane climb conducted at the specified takeoff climb speed.



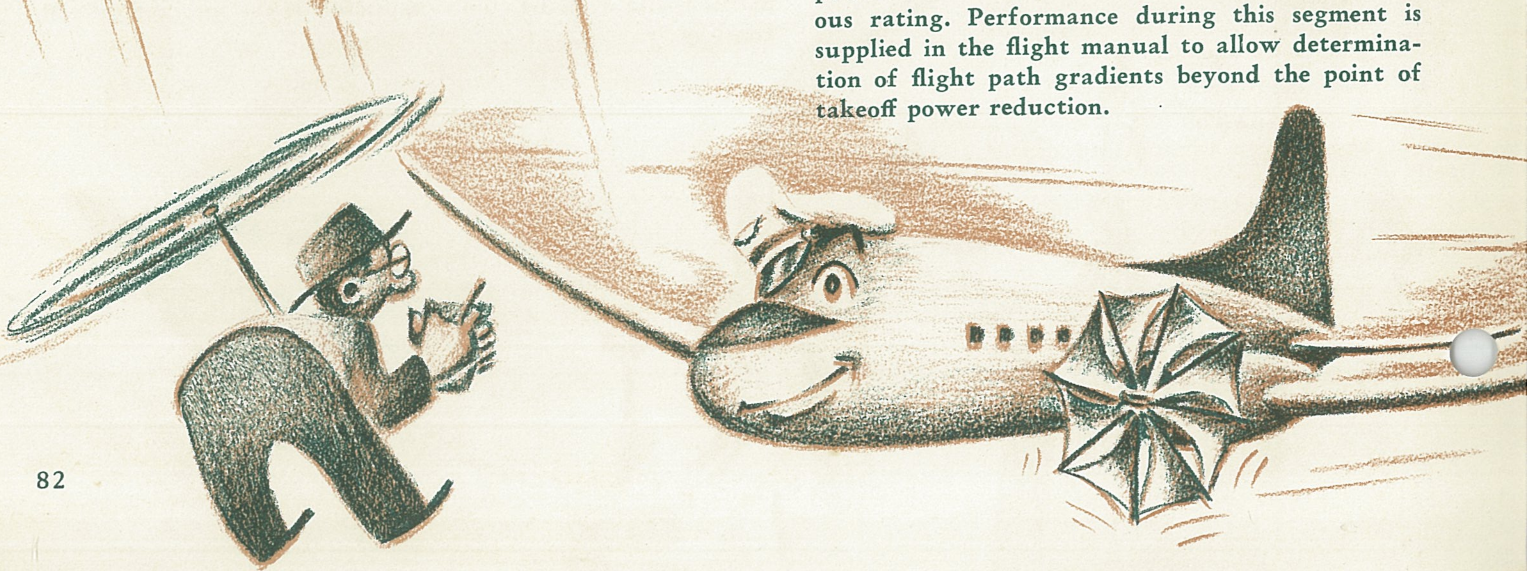
SECOND TAKEOFF SEGMENT. The second takeoff climb segment is required to have a minimum rate-of-climb equal to $.035{Vs_1}^2$. Vs_1 represents the stall speed for the subject climb configuration and gross weight. The configuration for this segment consists of wing flaps in takeoff position, landing gear retracted, one engine inoperative with propeller windmilling on the low-pitch stops, the other engine operating at takeoff power, cowl flaps in takeoff cooling position, and the airplane climb conducted at the specified takeoff climb speed.

Note: It is recommended that wheels be braked prior to the retraction cycle so as to minimize vibration due to unbalanced tires and to preclude the possibility of damage caused by loose tire treads.

THIRD TAKEOFF SEGMENT. The minimum required rate-of-climb for the third takeoff climb segment is the same as for the second segment, $.035{Vs_1}^2$. The configuration for this segment consists of wing flaps in takeoff position, landing gear retracted, one engine inoperative with propeller feathered, the other engine operating at takeoff power, cowl doors in takeoff cooling position and airplane climb conducted at the specified climb speed.

Note: The use of an autofeather installation alters the configurations of the takeoff climb segments as the propeller is automatically feathered in the first takeoff climb segment. This results in the same configuration for the second and third takeoff climb segments since the only difference without autofeathering is the windmilling propeller of the second takeoff climb segment.

FOURTH TAKEOFF SEGMENT. No minimum value of rate-of-climb is required for the fourth segment. Airplane configuration for this segment is identical with the third segment except for power which is reduced to the maximum continuous rating. Performance during this segment is supplied in the flight manual to allow determination of flight path gradients beyond the point of takeoff power reduction.



The takeoff climb speed is usually selected by the manufacturer on the basis of the minimum allowable as specified in CAR 4b. This is desirable since it will provide the shortest ground run for takeoff. The minimum allowable takeoff climb speed as specified by CAR 4b is 1.2 Vs_1 or 1.1Vmc. Vmc represents the airplane minimum control speed with one engine inoperative, propeller feathered with autofeathering, the other engine at takeoff power, wing flaps in takeoff position, and landing gear retracted.

Any one of the aforelisted takeoff climb segments, with the exception of the fourth segment may restrict the takeoff gross weight to a value less than the maximum structural gross weight. However, in the case of the CV340 and CV240, all of which are equipped with an autofeather installation, the takeoff gross weight will usually be limited by what is defined as the "second and third" takeoff climb segments for these airplanes.

The enroute climb segment with one engine inoperative may also restrict the maximum permissible takeoff gross weight. The minimum specified rate-of-climb for the one-engine inoperative enroute climb segment is $.02Vso^2$. Vso signifies the stall speed for the landing configuration flap position and the particular gross weight. The enroute climb segment configuration consists of one engine inoperative with propeller feathered, wing flaps retracted, gear retracted, and the inoperative engine at maximum continuous power. The enroute climb speed is usually selected on the basis of the best rate-of-climb or the minimum speed at which adequate engine cooling can be demonstrated. Compliance with the required rate-of-climb ($.02Vso^2$) at 5000 feet altitude must be observed at the maximum permissible structural gross weight and/or the maximum gross weight as determined from the third segment climb performance.

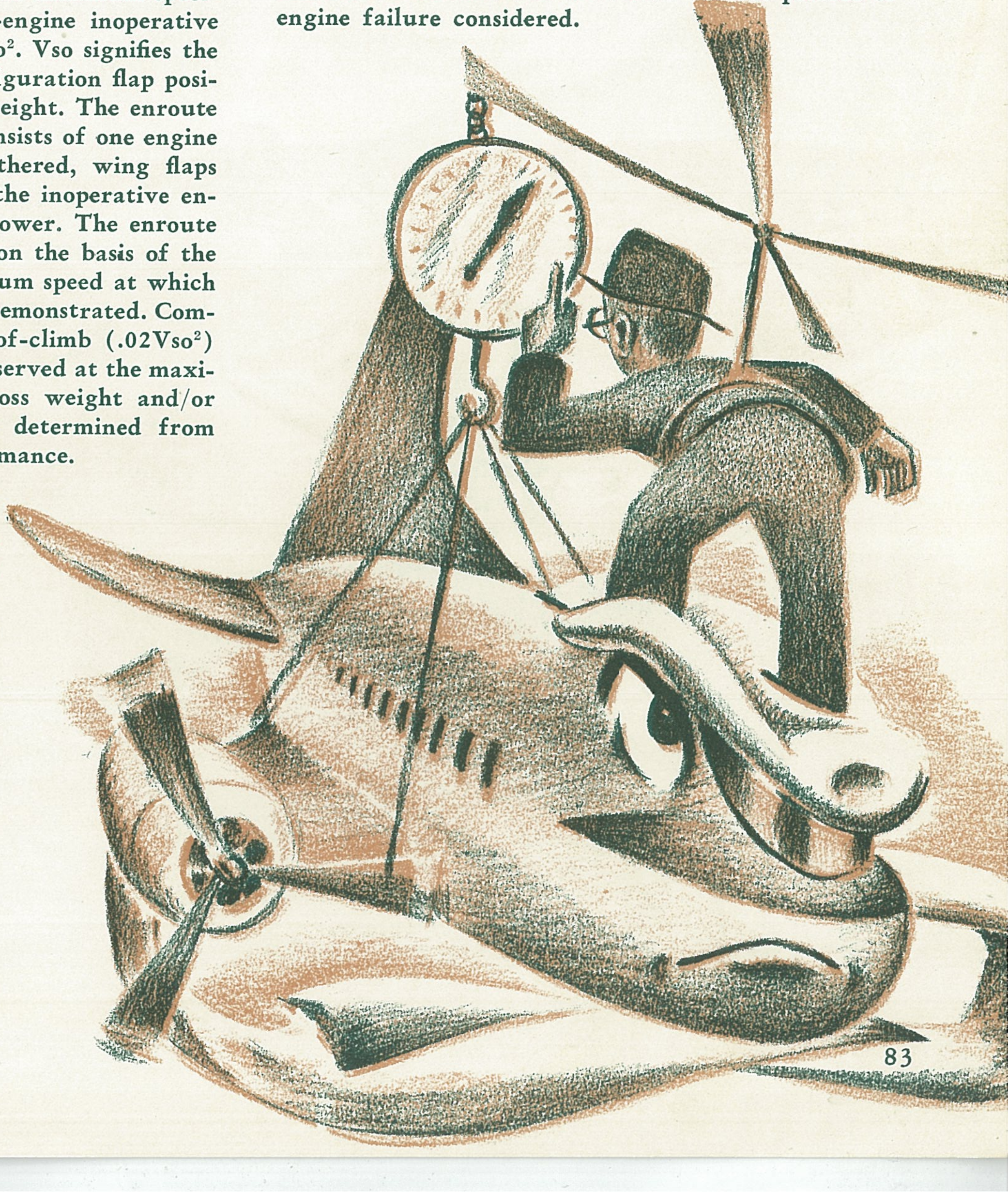
The takeoff gross weight of an airplane not equipped with a fuel jettisoning installation is restricted to 105% of the maximum landing gross weight. In turn, the landing gross weight may be restricted by performance limitations to a value less than the maximum structural landing weight.

The rate-of-climb requirements are second to the structural limits in establishing the maximum allowable takeoff gross weight for a specified condition. In some instances, however, the available takeoff field length obstacle and/or terrain clearance may limit the takeoff gross weight to a value less than the structural gross weight limitation or the climb performance gross weight.

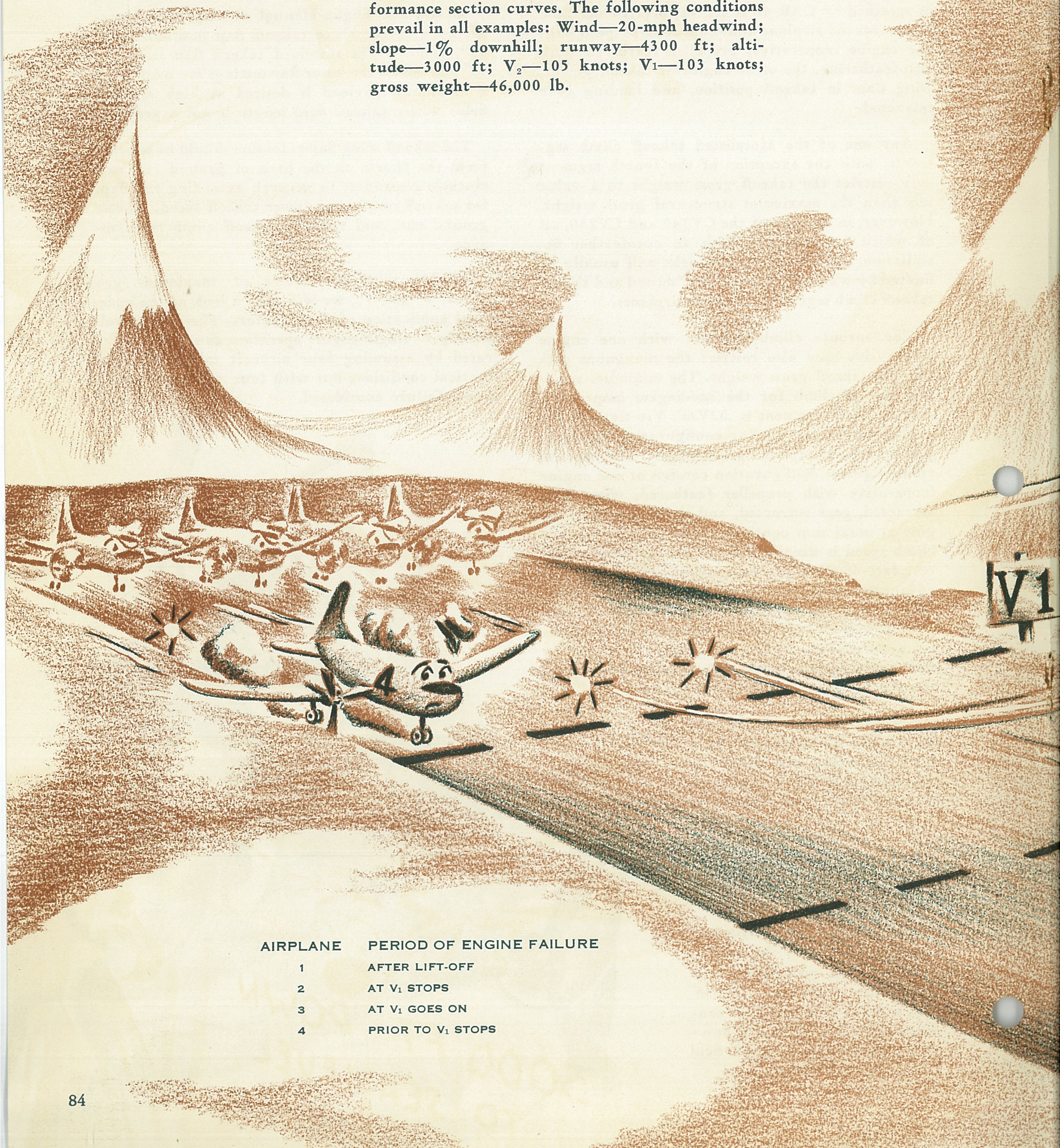
In the 340 Flight Manual are separate curves for each of the three takeoff flap positions: 15°, 11°, and 5°. The standard takeoff flap setting is 15°; however, the lesser flap settings are used when a maximum payload is desired at high altitude fields where takeoff field length is not a problem.

The takeoff wing flap extension should be selected from the charts on the basis of ground run and obstacle clearance. In general, extending the flaps for takeoff results in a lower takeoff speed, shorter ground run, and reduced takeoff climb performance.

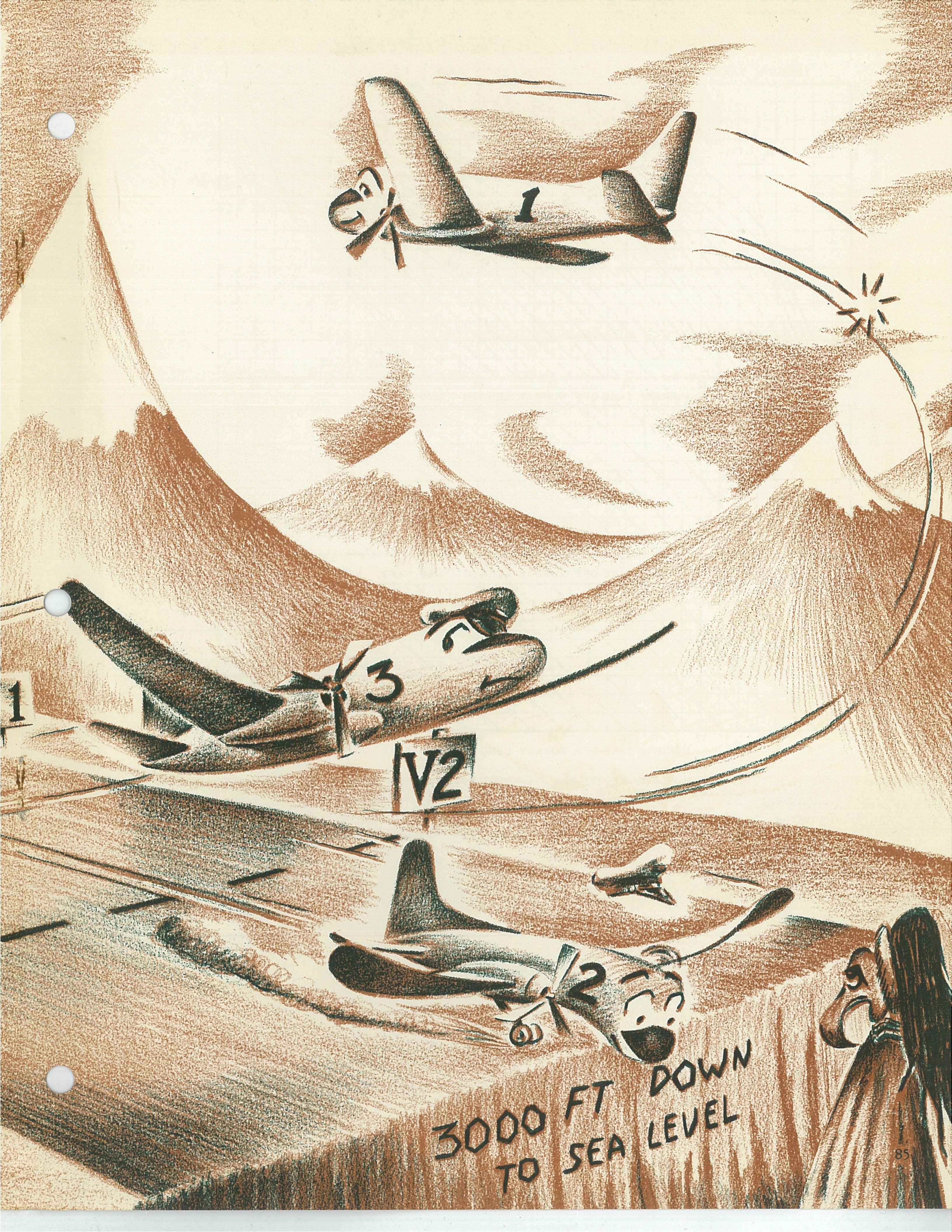
Fortified with knowledge of maximum gross weight, V_1 and V_2, we will take a look at the operational application of these factors. Their exact relationship to single-engine operation can best be illustrated by assuming four aircraft taking off under identical conditions but with four various periods of engine failure considered.



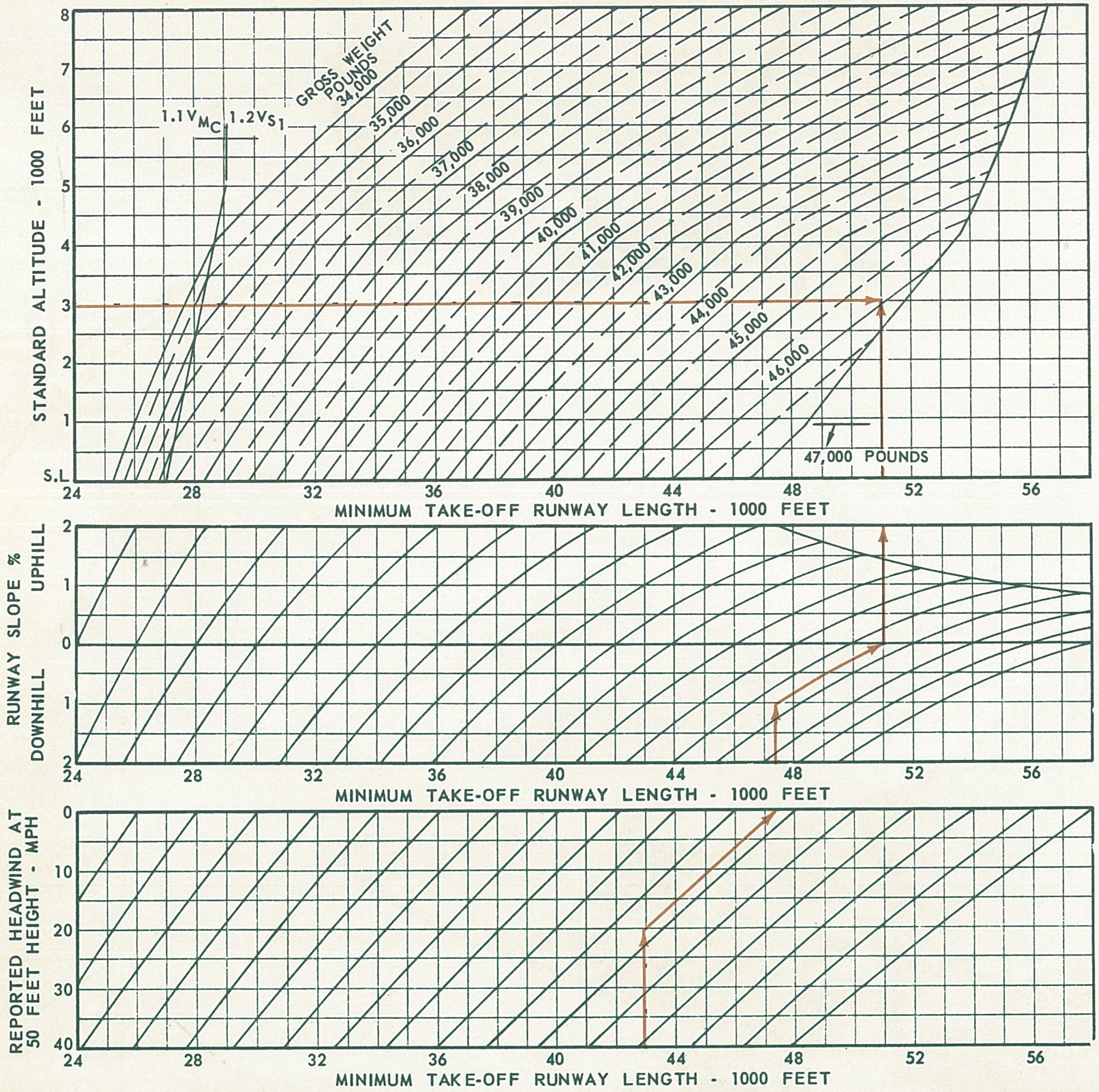
As an example, let us assume some airport conditions and illustrate determination of maximum operating weights by use of Flight Manual performance section curves. The following conditions prevail in all examples: Wind—20-mph headwind; slope—1% downhill; runway—4300 ft; altitude—3000 ft; V_2—105 knots; V_1—103 knots; gross weight—46,000 lb.



AIRPLANE	PERIOD OF ENGINE FAILURE
1	AFTER LIFT-OFF
2	AT V_1 STOPS
3	AT V_1 GOES ON
4	PRIOR TO V_1 STOPS


1
1
3
V2
2
3000 FT DOWN
TO SEA LEVEL

MINIMUM TAKE-OFF RUNWAY LENGTH (FOR ZERO WIND & HEADWIND USE ONLY)



CONDITIONS:

Hard surface runway—no obstacle at end of runway.
Takeoff speed (see Minimum Takeoff Climb Speed chart).
Wing flaps in takeoff position (15°).
Cowl doors open two inches.
Standard atmospheric conditions.
P&W R2800 CB16 engines—H-S 43E60/6895A-8 propellers.

NOTE:

If one engine fails at the critical engine failure speed, distance to stop is equal to distance to continue takeoff to 50-foot height. The distances from V_1 to V_2 and climb-out, and V_1 to stop are based on autofeathering at V_1. The favorable wind used in the construction of this chart equals 50% of the reported headwind at 50-foot elevation.

TO FIND MAXIMUM ALLOWABLE TAKEOFF WEIGHT:

1. Go vertically up given 4300-ft field length to reported 20-mph headwind line.

2. From this point, parallel wind nomogram lines to 0-mph wind line.

3. From this point, which is on 4750-ft field length line, go vertically up to 1.0% downhill slope line.

4. Then, parallel slope nomogram lines to 0% slope line.

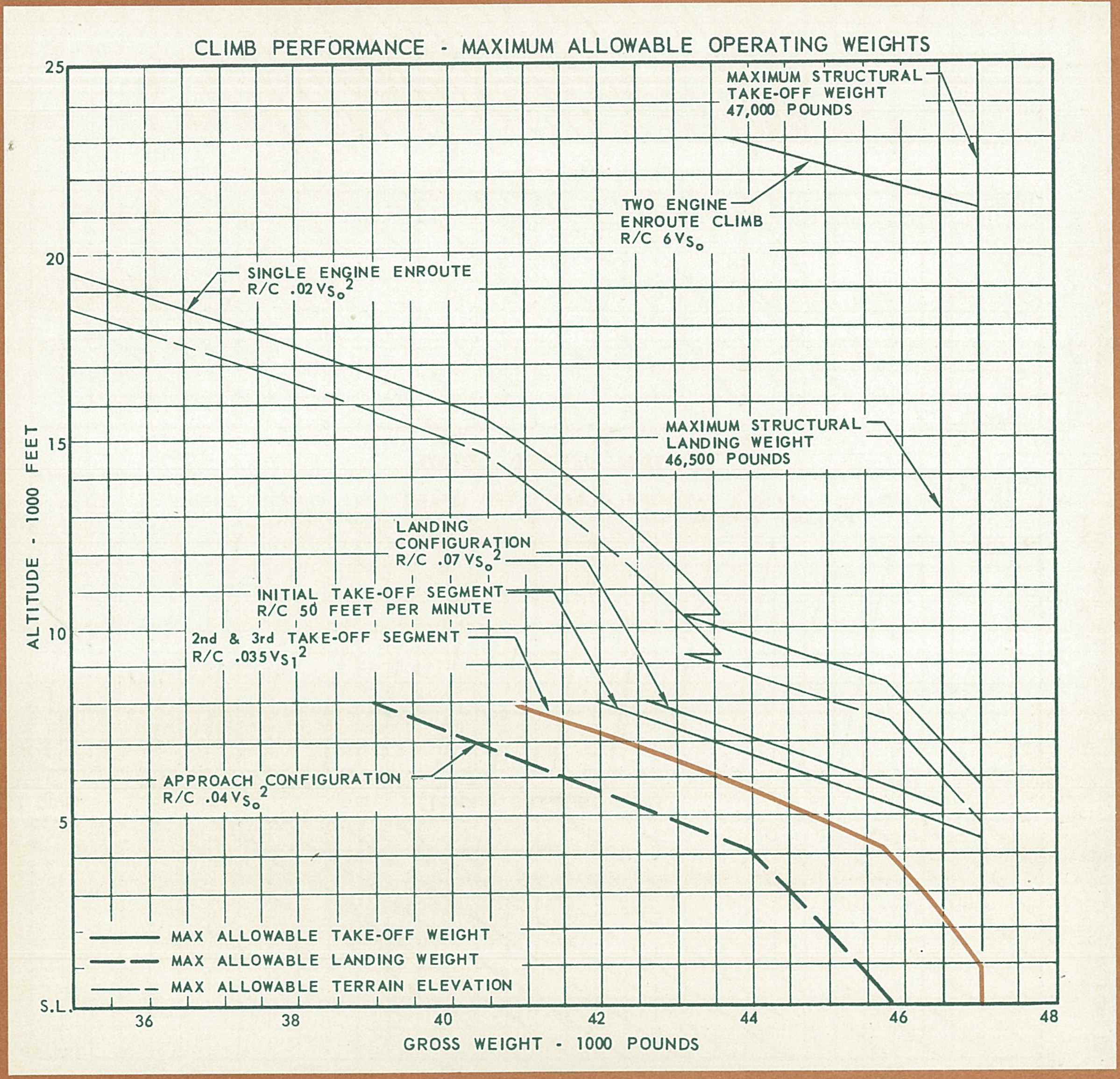
5. From this point, which is on 5120-ft field length line, go up vertically to 3000-ft airport elevation line.

6. Final intersection falls on 46,000-lb gross weight nomogram line and is maximum allowable takeoff gross weight.

It may be noted that runway length limits the takeoff gross weight (even though a favorable wind and slope exist) and not the climb ability of the airplane.

The brown line represents the altitude-gross weight combination limit established by the single-engine climb ability of the airplane and is obtained from the chart below. In other words, if the resultant combination of runway length, runway slope, and wind intersected the airport elevation to the right of the indicated line, takeoff gross weight must still be restricted within the limits of the line.

Note that example falls to the left of line, which indicates that gross weight is limited by field length and not by climb performance.

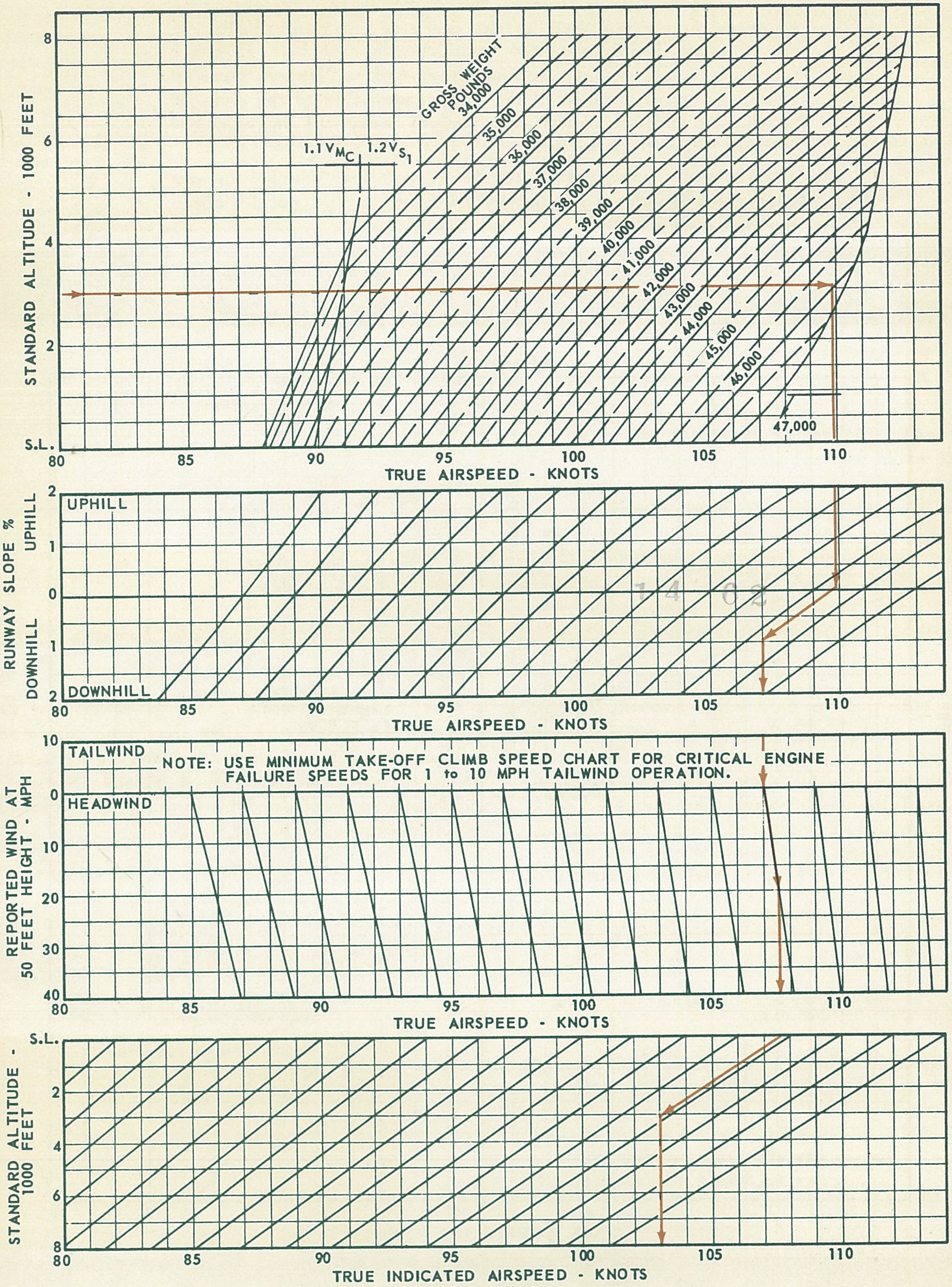


Takeoff flap 15°   Approach flap 24°   Landing flap 40°

P&W R2800 CB16 engines   H-S 43E60/6895A-8 propellers

Note: All takeoff powered performance—wet rating

CRITICAL ENGINE FAILURE SPEED (V_1)



NOTE: USE MINIMUM TAKE-OFF CLIMB SPEED CHART FOR CRITICAL ENGINE FAILURE SPEEDS FOR 1 to 10 MPH TAILWIND OPERATION.

NOTE

If one engine fails at the critical engine-failure speed, distance to stop equals distance to continue to 50-foot height. Critical engine-failure speed not to exceed the minimum takeoff climb speed.

Now that maximum allowable takeoff weight has been established, determine critical engine failure speed or V_1 as it is commonly known.

1. Go horizontally across 3000-foot airport elevation line to maximum allowable takeoff gross weight line of 46,000 pounds.

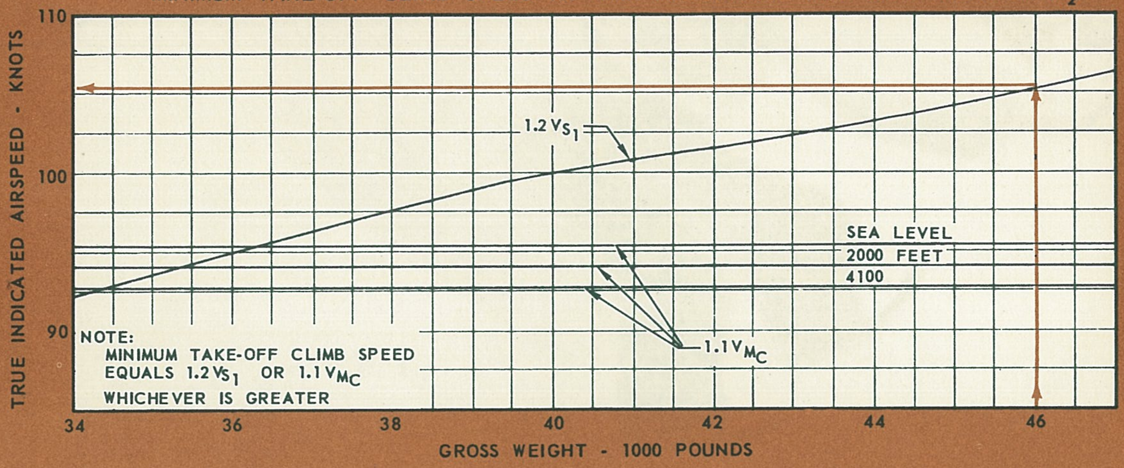
2. From this point, which is on 109.9-knot line, go down vertically to 0% slope line.

3. Parallel slope nomogram lines from this point to 1.0% downhill slope line.

4. From this point, which falls on 107-knot line, go down vertically to 0-mph wind line.

5. Parallel wind nomogram lines from this point to 20-mph headwind line. This parallel at 20-mph headwind line intersects 107.6-knot *true airspeed* line which is critical engine failure speed.

MINIMUM TAKE-OFF CLIMB SPEED AT MAX ALLOWABLE FWD C.G. LOCATION (V_2)

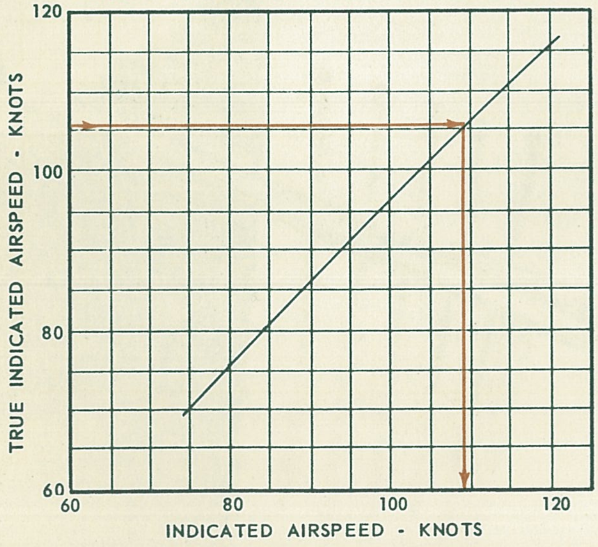


14 62

To get indicated airspeed value for critical engine failure speed, drop vertically down 107.6-knot line to zero elevation line; then parallel speed nomogram lines to 3000-ft elevation line. Point of intersection falls on 103-knot true indicated airspeed line, which is indicated value for critical engine failure speed.

Now compare preceding computed critical engine failure speed with that shown on Minimum Takeoff Climb Speed chart. Velocity to be used is the lower of these two values. Velocity shown is 105.2 knots; therefore, 103-knot value is critical engine failure speed to be used.

GROUND OPERATION - AIRSPEED CALIBRATION



To obtain a correct indicated airspeed reading for critical engine failure or minimum takeoff climb speeds, independent of instrument error — (for ground operation), check the accompanying chart. The brown line is V_1 to be read on the airspeed indicator.

For airborne operation, refer to page P-10 of the Flight Manual.

14 62